DOCUMENT RESUME

ED 233 092	UD 022 860

TITLE	Mathematics. Elementary and Middle School Curriculum Objectives.
INSTITUTION	Boston Public Schools, Mass.
PUB DATE	82
NOTE	137p.
PUB TYPE	Guides - General (050)
EDRS PRICE	MF01/PC06 Plus Postage.
DESCRIPTORS	Curriculum Development; *Educational Objectives; Elementary Education; *Mathematics Curriculum; *Mathematics Instruction; Middle Schools
IDENTIFIERS	Boston Public Schools MA; Massachusetts Basic Skills

ABSTRACT

This document contains a set of curriculum objectives in mathematics for elementary and middle school students in Boston, Massachusetts. The objectives, which include all the Massachusetts Basic Skills, were based on a wide variety of curricula, textbooks, and academic literature, and were reviewed by several teachers, administrators, and parents in Boston. The specific objectives are presented by level (kindergarten to level eight) under seven headings: (1) numbers and numeration; (2) computation; (3) fractions; (4) decimals and percent; (5) measurement; (6) geometry; and (7) estimating, graphs, etc. The report has been designed to allow one to trace objectives that relate to a specific skill, through successive levels of increasing difficulty. Checklists for monitoring student progress at each level are included. (MJL)

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ED233092

MATHEMATICS

ELEMENTARY AND MIDDLE SCHOOL CURRICULUM OBJECTIVES

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Jean Sullivan McKeigue,
President
John D. O'Bryant
Kevin A. McCluskey
Jean M. McGuire
Rita Walsh-Tomasini

Robert R. Spillane
Superintendent of Schools

Oliver W. Lancaster
Deputy Superintendent
for Curriculum and Instruction

Boston Public Schools
26 Court St., Boston
Massachusetts, 02108

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MESSAGE FROM THE SUPERINTENDENT

I want to thank all who contributed to this set of curriculum objectives. It is a synthesis of a number of previous documents, from inside and outside the Boston Public Schools, and draws on a wide range of experience. Teachers, principals, high school department heads, central office staff, parents, university professors, and educators from other school systems gave generously of their time and wisdom in the development of this document. It is this breadth of source material and input which makes it so strong and potentially helpful.

These objectives are comprehensive and demanding. They convey high expectations to our students. They also pose a challenge to all those who work with students in this school system. Many of our studends are now below grade level; our challenge is to find ways of helping them gain ground each year. Many of our students have difficulty with some areas of mathematics; our challenge is to discover and share the keys that open the way to understanding. Many of our students are currently moving from grade to grade without the skills necessary to handle new material; our challenge is to reach the point where teachers can be sure that incoming students have certain basic skills and knowledge. Our efforts in the past have often been fragmented; our challenge is to create a cohesive, cooperative effort in each school, so that regular education, 766, bilingual, advanced work, and funded program teachers, administrators, parents, university personnel, school volunteers, and others work together to give our students the first-rate education they deserve.

While this document lays out clear objectives for students at each grade level, it leaves great flexibility for teachers and principals to decide which methods and materials will be most effective. The philosophy behind the curriculum is that there must be common citywide goals and objectives, but those who work most closely with students are in the best position to decide how best to teach the curriculum - and what to do beyond it. Thus the purpose of this document is to harness the efforts of all school personnel in a common endeavor, and at the same time liberate the creative energy and dedication that exists in each of our schools.

Robert R Spillane

Robert R. Spillane
Superintendent of Schools

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INTRODUCTION

Aims and Scope

The purpose of this document is to spell out clear objectives in mathematics for all Boston elementary and middle school students. The objectives at each level are a statement of what students ideally should have mastered at the corresponding grade level. The objectives include all the Massachusetts Basic Skills, and will be directly linked to competency tests at each level to measure students' individual progress.

This document is intended to clarify what students should know; it does not deal with how students should be taught. Decisions on methods and materials will remain in the hands of teachers and principals, with help from others on request. Those who work most closely with students are in the best position to decide the many instructional questions raised by this set of objectives.

The objectives at each level are both a maximum and a minimum curriculum. They cover the full range of topics generally present in textbooks and other school systems at the corresponding grade level. The sheer number of objectives is ambitious, reflecting very high expectations of our students. Nested within the maximum curriculum is a set of minimum essentials. These priority objectives, which are circled, are those which all students should master. They reflect the Massachusetts Basic Skills objectives and a consensus among Boston teachers as to which objectives are most important.

Development

The objectives are based on a wide variety of sources inside and outside the Boston Public Schools:

- -previous Boston curriculum documents
- -the Massachusetts Basic Skills regulations
- -exemplary curriculum documents from around the country
- -a survey of the content of major textbooks
- -academic literature on mathematics instruction
- -interviews with consultants and university experts on mathematics
- -comments on earlier drafts of this document by selected teachers, administrators, parents, and others
- -a detailed critique of the draft by more than 1,000 Boston teachers, parents, administrators, and others.

Priority Objectives

The circled priority objectives at each level were determined by the following process. Teachers reviewing the draft in February, 1982 were asked to circle the objectives at their level which they thought should be minimum competency requirements and cross out those they felt were inappropriate. A tabulation of teachers' responses was used to evaluate objectives: if 40% or more circled an objective and less than 25% crossed it out, that objective was considered a prime candidate for the list of priority skills. If 40% or more crossed out an objective and less than 25% circled it, the objective was either moved up to a higher level, modified, or dropped.

The resulting list of priority objectives reflected a strong consensus among teachers, but did not always flow smoothly from level to level or meet all the

State requirements. In order to produce a coherent spiral curriculum that met State standards, the following exceptions to abiding with the popular will were made:

- -where a strand of priority skills running through the levels was interrupted at one or two levels, the exceptions were circled
- -where an uncircled objective contained enabling skills vital to priority objectives at higher levels, it was circled (often after being modified)
- -where objectives were essential components leading to State objectives, they were circled
- -where there were too many circled objectives to be reasonably covered in a year, objectives that made the least direct contribution to State objectives were uncircled.

These modifications were relatively minor, and the circled items at each level reflect a broad consensus among Boston teachers on mathematics priorities. The circled items more than fulfill State requirements. Below are the total number of objectives at each level, followed by the number of circled items:

Level	Total	Circled
Kind.	33	33
One	53	43
Two	57	49
Three	62	51
Four	87	64
Five	91	64
Six	102	69
Seven	108	70
Eight	118	69

Are There Too Many Objectives?

At first glance, it may seem that even the priority objectives are too numerous to be covered by most students in the course of a year. But there are several mitigating factors:

- -many objectives are so narrow that they can be taught in less than a class period (e.g. the meaning of A.M. and P.M. in telling time)
- -many objectives can be clustered together and taught in units (e.g. addition, subtraction, checking for errors, and word problems)
- -objectives from one part of the curriculum can be taught with objectives from another part (e.g. multiplication with finding area and volume)
- -most objectives take skills developed in previous levels and extend them to an only slightly more difficult level (e.g. Level Four addition objectives involve four-digit numbers where Level Three involved three-digit numbers)
- -the measurement objectives, which are numerous, overlap to some extent with material covered in science

Thus the circled objectives should not pose an overwhelming challenge to students at each level, if students are appropriately placed. If there are problems with the quantity of objectives, with appropriateness to a particular level, or with wording, they will be dealt with in an annual review of this document.

General Framework

The objectives at each level are organized under seven headings:

A. Numbers and Numeration
B. Computation
C. Fractions
D. Decimals and Percent
E. Measurement
F. Geometry
G. Estimating, Graphs, Etc.

Specific objectives are developed under each heading and moved through the levels with gradually increasing difficulty and complexity. Although the numbering of the objectives is not parallel from level to level, it is possible to trace the various strands by looking at the lower-case letters near the center line of each page. There is also a full vertical skills list a few pages below. A correlation of these objectives with State Basic Skills begins on page 117.

The Two-Column Format

All objectives are presented in two columns. The left-hand column states the objective in general terms and gives an idea of its scope. The right-hand column gives a specific example of what students should be able to do once the objective is attained. The right column can serve as a blueprint for competency tests, but is not in itself a test. Items may vary within the scope of the objective as outlined in the left-hand column.

Levels vs. Grade Levels

Although the material at each level corresponds to generally-used topics at each grade level (i.e. Level Three contains third grade material), the levels are not labeled by grade level. This is intended to allow more flexibility for students to work below or above their chronological grade level. The instructional assumption here is that students should be placed in materials that are appropriately challenging for them - i.e. at their instructional level. We want to avoid giving students material that is too hard or too easy, and given the wide range of achievement in our schools, this points to flexible grouping, individualization, or other strategies for getting students working at the optimum level of challenge.

Our long-range goal must be to get all students working at least on grade level. But as we work toward that goal, a leveled curriculum should give us a better way of placing students properly and giving them material in which they can experience success. For students working below grade level, this should result in less stigma--yet still provide a strong incentive to catch up.

The most difficult period will be the first two or three years of this curriculum, when we will be grappling with issues of testing, placing, and promoting students in accord with these objectives. But as students are taught this material and begin to move to the next level with more and more basic skills, the work of teachers at all grade levels will become progressively easier, more productive, and more satisfying.

Special Education and Bilingual Students

Since inclusion into regular education classrooms is our ultimate goal for both 766 and Bilingual students, children in these programs should be working toward the same objectives as regular education classes. Special education and Bilingual teachers will undoubtedly use a somewhat different array of methods and materials than most regular education teachers; they may not cover as many of the objectives; and they may adopt different testing procedures (for example, some Bilingual students might take competency tests in their native language). But teachers' efforts must be aimed at getting students working successfully at the highest possible level in this curriculum. The only students who are exempt from these objectives are 766 students whose Individual Education Plans specifically state that they should pursue curriculum objectives other than those in this document.

The Department of Student Support Services has suggested the following guidelines for implementation of this curriculum for 766 students:

1. The objectives are applicable in the daily instructional program of 766 students.
2. Teachers should select the level that matches the current achievement level of each student.
3. Teachers should choose methods and materials that match the learning style of their students.
4. These objectives should be used as criteria for measuring students' progress.
5. These objectives should be included in students' I.E.P.s along with their current level of achievement and the methods used for instruction.
6. Special education and regular education teachers should collaborate on these objectives to maximize mainstreaming opportunities for special needs students.

Work is currently under way to coordinate the SEIMS cognitive objectives with the objectives in this document.

Implementing the Objectives

The objectives in this document will clarify what Boston students should be able to do at each level, and competency tests should focus students on the objectives and give teachers useful feedback on students' progress. But the most important decisions - those which really determine what students learn - cannot and should not be made by a central office document. Below is a list of some of the things teachers should be thinking about as they prepare to teach mathematics in elementary and middle schools.

1. Readiness - preparing students for new material by giving them the underlying concepts
2. Review - using previously-covered material as a base for new learning
3. Sequence - deciding on the best order in which to attack these objectives
4. Blending - finding ways to mix different parts of the curriculum, blending the abstract with the applied
5. Materials - seeking out the most effective textbook passages, workbooks, worksheets, overhead transparencies, manipulatives, games, class activities, etc. to convey this material to students
6. Enrichment - deciding on topics and activities beyond the scope of this curriculum
7. Relevance - finding ways to make mathematics come alive in students' everyday lives
8. Problem-solving - helping students develop a step-by-step approach to attacking word problems and complex computational algorithms
9. Calculators - deciding how to use calculators to help students check

their computation or solve word problems

10. Individualization - deciding to what degree students can work at different levels in the same classroom

11. Achievement grouping - deciding with other teachers on whether to group students based on their mastery of various levels of the curriculum

12. Learning experiences - finding ways of making objectives, materials, and teaching come together in a way that children learn, know they're learning, and enjoy the whole process.

Issues in Mathematics Education

Buffeted by Sputnik, the New Math, Back-to-Basics, calculators, and microcomputers, mathematics curriculum documents have veered in several different directions in recent years. Given this recent history of changeability, it is incumbent on curriculum writers to lay their mathematical cards on the table. Below is an explanation of the positions implicit in this curriculum.

New Math There is very little material on set theory, different bases, and other New Math topics in this document. This reflects a consensus among most textbook authors and curriculum experts that the approach taken in the 1960's to teaching mathematical concepts was unproductive for most students. There are better ways to teach a broader range of students about mathematical processes, most of them falling under the heading of methods and materials used in classrooms.

Back-to-Basics Some educational neo-conservatives advocate a very heavy emphasis on basic computational skills to the exclusion of other aspects of mathematics such as geometry, measurement, probability, and problem solving. This document has a broader scope, reflecting the belief that too narrow a focus on computation disconnects mathematics from the real world and misses many opportunities to link computational skills to other parts of mathematics. At each of its nine levels, this curriculum covers a balanced range of skills so that students should emerge with strong computational skills, knowledge of other areas of mathematics, and the ability to put their skills and knowledge to work in the real world.

Developmental Stages The work of Jean Piaget and other developmental psychologists has made educators far more sensitive to the way some mathematical skills have been introduced before children were ready to learn them. This document attempts to avoid these pitfalls. For instance, probability theory, which is introduced in primary grades by some textbooks and curricula, is probably inappropriate before the stage of formal operations. It is not a priority objective in this curriculum until Level Six.

"Hands-On" Math The work of Piaget and others has also alerted math educators to the need for manipulatives to help students understand mathematical concepts in the elementary grades. Many teachers remain skeptical, believing that pencil-and-paper drill is the best way for children to understand math. This document cannot persuade teachers of the validity of either position, since it does not dictate the methods and materials used to reach the objectives. What this document does do is challenge teachers and staff developers to find the methods and materials that result in the most student progress. If Piaget is right, the use of manipulative materials should produce faster learning and better retention of these skills. If he is wrong, another method may produce the most progress. It is up to teachers and staff developers to find the most effective teaching strategies.

Problem Solving Some mathematics educators want to put far more stress on practical problem-solving. While this is an important and often-neglected part of mathematics, it should not be pursued to the exclusion of developing students' skill in manipulating numbers and getting a sense of numerical rules and patterns. A curriculum that consists entirely of "pure" computation fails to prepare students to use their math in the real world. But a curriculum dominated by word problems may underemphasize work with numbers and prevent students who have reading problems from experiencing success in math. This document strikes a balance between these two extremes, with word problems in almost every section but separate objectives in "pure" computation.

Calculators The penultimate draft of this curriculum proposed that students at levels Six, Seven, and Eight be allowed to use calculators on their competency tests. Many teachers raised a practical objection to this idea - how could we supply calculators to students who did not own them? - and strongly disagreed with the idea that there was a point beyond which students no longer needed to be able to do pencil-and-paper computation. The final version of this curriculum agrees with this argument. Students will have to do their own computing at all levels. However, one of the general goals of the curriculum remains learning to use calculators to take short-cuts in computation and solve word problems. To the extent that teachers can acquire class sets of calculators and use them to teach problem-solving and help students cut through some of the drudgery of some computation, their students should do better with these objectives. But that is an instructional and staff development issue which must be decided in the schools.

Computer Literacy As a new generation of microcomputers appears in more and more homes and businesses, there are calls for elaborate K-12 computer literacy programs in the schools. Because computers are usually associated with math, the math curriculum is often seen as the logical place for these computer literacy objectives. However, there are several factors which suggested that a computer literacy strand in this curriculum was inappropriate:

- Very few Boston elementary and middle schools have microcomputers. To promulgate computer curriculum without computers is to ask students and teachers to take part in a frustrating and probably fruitless exercise. Computer instruction in any school should await the time when students can get their hands on real computers.
- Very few Boston teachers are trained to teach a computer curriculum. The promulgation of a computer curriculum should go hand in hand with such training.
- There are disagreements in the computer field about what skills students need to work with the new generation of computers. For instance, some educators feel that flow-charting, a traditional computer literacy skill, is no longer necessary with the highly interactive microcomputers. Any Boston computer curriculum will need to consider issues like this and resolve them only after wide consultation.
- Computer literacy does not consist entirely of math-ralated skills. In fact, many current uses of microcomputers - word processors, for instance - have more to do with reading and writing skills. A convincing case can therefore be made that computer literacy does not belong in the mathematics curriculum, but rather should be a multi-disciplinary course that prepares students to use computers in a variety of situations.

-Finally, many computer experts agree that the best preparation for working with computers is a mastery of basic academic skills: computation, reading and writing, and clear, sequential thinking. The new Boston elementary and middle school math and reading/language arts curriculum objectives cover these prerequisites, and students who master the objectives will be well prepared to embark on the computer literacy curriculum that will be developed.

Metric Education Despite the United States' indecision about finally "going metric," it is clearly important for children to be conversant with both the English and the metric system by the time they reach middle school. One unmistakable message from Boston elementary teachers in their response to the earlier draft of this curriculum, however, was that third and fourth graders are overwhelmed by the task of mastering both systems at once. Therefore the final objectives take a more gradual approach, introducing only the English system in Level Three and phasing in the metric system in Level Four and Five. The measurement section also emphasizes practical uses of both English and metric units, and eschews objectives dealing with conversion from one system to another until Level Eight.

PHILOSOPHY AND GOALS

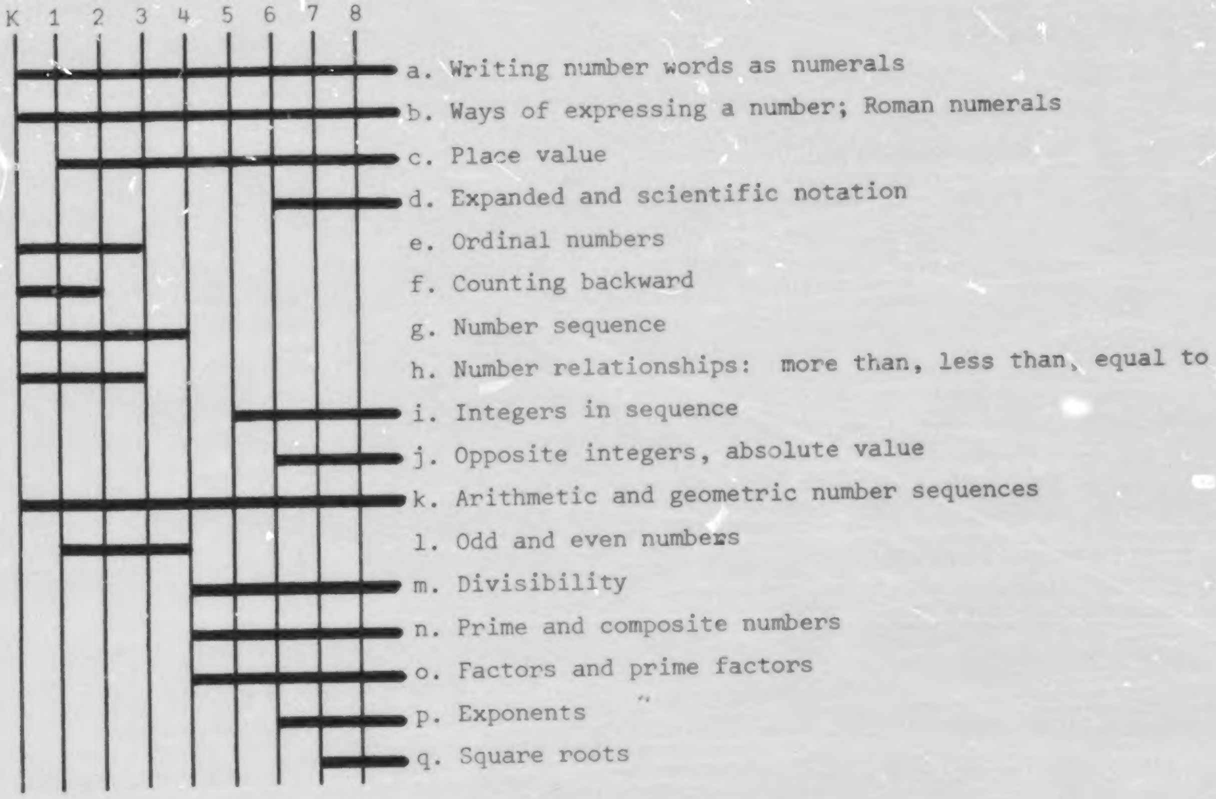
The goal of mathematics instruction implicit in this document is the maximum development of students' mathematical and problem-solving power. Accordingly, math classes from Kindergarten through eighth grade should help students in:

1. Understanding the workings of the decimal number system.
2. Understanding some of the patterns into which numbers fall.
3. Understanding mathematical terms.
4. Mastering basic computational skills: addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals.
5. Learning how to work accurately and check for errors.
6. Estimating answers and testing the reasonableness of the results of computation as a way of avoiding errors.
7. Using calculators to check work and solve problems when basic concepts and skills are mastered.
8. Understanding units of measurement for time, money, and both English and metric length, capacity, and weight; applying knowledge in practical situations.
9. Understanding geometrical shapes and terms and seeing the application of geometry to the world.
10. Following directions and using formulae.
11. Interpreting different kinds of graphs, tables, and schedules.
12. Understanding and applying basic probability.
13. Attacking math problems in a systematic, step-by-step fashion.
14. Being able to apply mathematical skills and knowledge to other school subjects and in a variety of other settings.
15. Developing and maintaining a positive attitude toward mathematics based on success, good associations, and relevance.

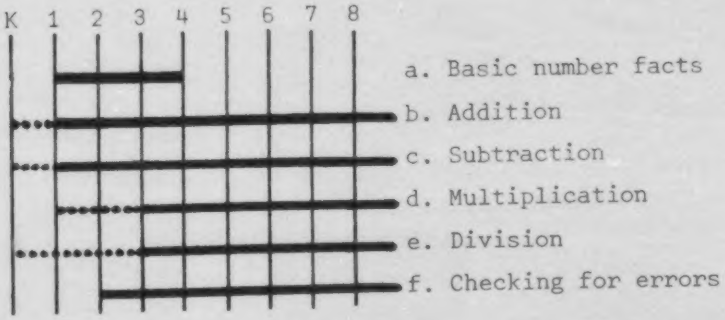
VERTICAL SKILLS LIST

This section traces the strands that run vertically through the levels K - 8. The bar graph on the left shows the level at which a strand is introduced and the levels through which it is developed. The lower-case letters for each strand correspond to the lower-case letters just to the left of the center line by each objective. For instance, under Computation, the c strand is subtraction; by looking for the letter c under Computation at each level, it is possible to trace this strand from K - 8. (A dotted line on the bar graph means readiness activities or a partial introduction of a strand.)

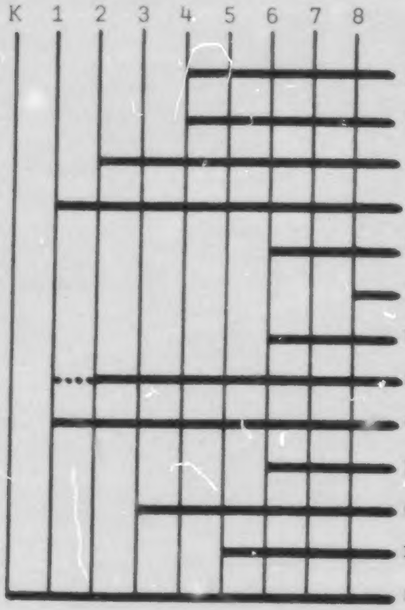
A. NUMBERS AND NUMERATION



B. COMPUTATION

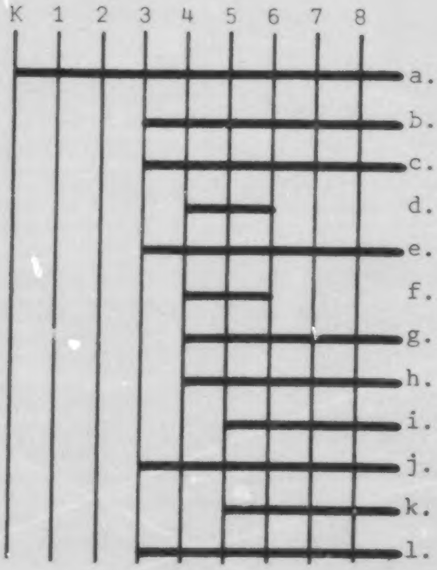


(computation continued)



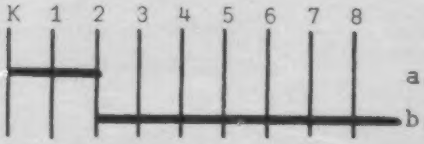
g. Mathematical terms
h. Averages
i. Working with multiples of ten to solve problems
j. Associative and commutative principles, order of operations
k. Exponent problems
l. Products and quotients of exponents with the same base
m. Integer problems
n. Writing closed and open number sentences
o. Missing numbers in computation; pre-algebra
p. Equations with one or two variables
q. Function machines
r. Word problems with insufficient information
s. Word problems with computation

C. FRACTIONS



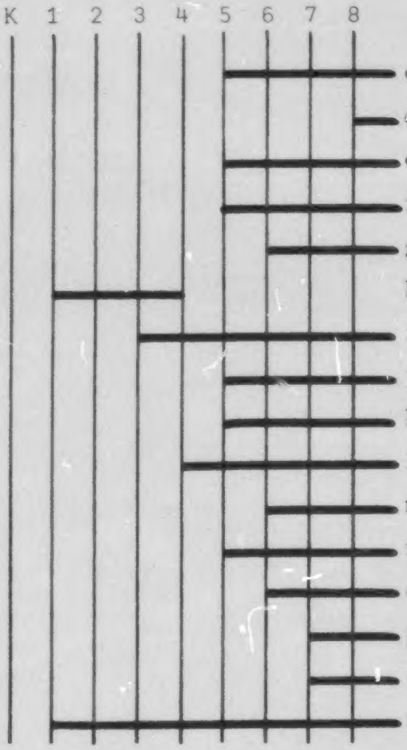
a. Basic identification of fractions
b. Arranging fractions in order
c. Complementarity of fractions to one whole
d. Addition and subtraction of common fractions
e. Equivalencies and simplifying
f. Addition and subtraction of mixed fractions, like denoms.
g. Addition and subtraction of mixed fractions, unlike denoms.
h. Multiplication of fractions
i. Division of fractions
j. Fractions terminology
k. Ratio and proportion problems
l. Word problems with fractions

D. DECIMALS AND PERCENT



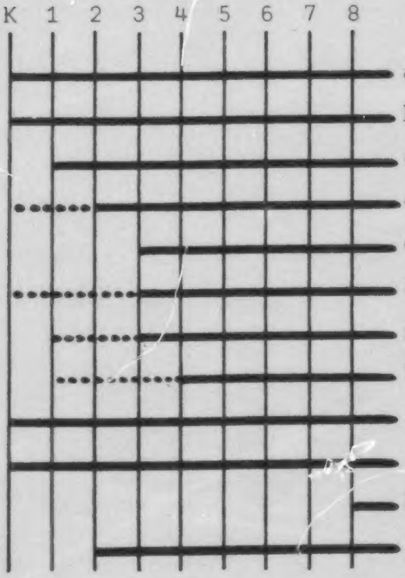
a. Identification of coins
b. Writing decimal and mixed decimal words as numerals

(decimals and percent continued)



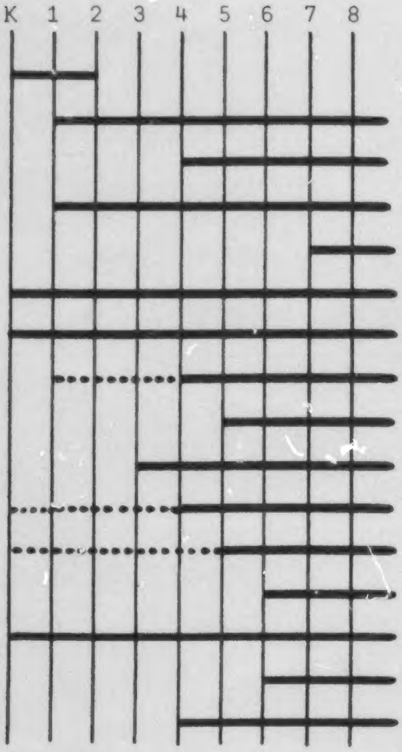
c. Decimal place value
d. Decimals in expanded form
e. Arranging decimals and mixed decimals in order
f. Dealing with redundant zeroes
g. Abbreviated decimal notation
h. Adding up the value of coins
i. Addition and subtraction of decimals
j. Multiplication of decimals and mixed decimals
k. Division of decimals and mixed decimals
l. Converting fractions into decimals
m. Converting decimals into percents
n. Converting fractions into percents
o. Finding the percent of a number
p. Finding the decimal part or percent one number is of another
q. Finding a number when the decimal or percent of it is known
r. Word problems with decimals and percent

E. MEASUREMENT



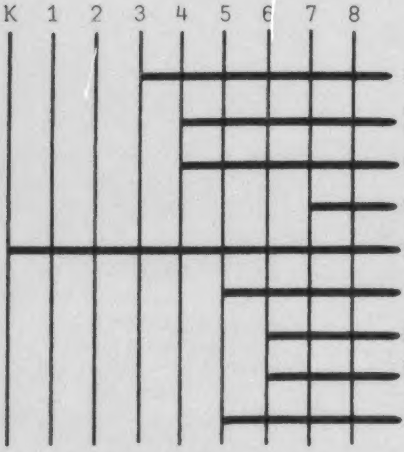
a. Telling time
b. Working with time units
c. Days in months, calendars
d. Measuring with a ruler, English and metric
e. Linear measurement units, English and metric
f. Capacity measurement units, English and metric
g. Weight measurement units, English and metric
h. Working with temperature, Fahrenheit and Celsius
i. Choosing an appropriate measurement instrument
j. Choosing an appropriate unit of measurement
k. Conversions between English and metric units
l. Estimating length, weight/mass, capacity, & time

F. GEOMETRY



a. Readiness
b. Terms and concepts with lines
c. Kinds of angles
d. Symmetry
e. Missing angles (supplementary, vertical, etc.)
f. Classifying shapes and dimensions, quadrilaterals
g. Two-dimensional figures
h. Similar and congruent figures
i. Kinds of triangles; parts of triangles
j. Finding perimeter
k. Finding area
l. Parts of circles
m. Finding circumference and area of circles
n. Three-dimensional figures (geometric solids)
o. Finding surface area
p. Finding volume

G. ESTIMATING, GRAPHS, ETC.



a. Rounding whole numbers and decimals, mixed decimals
b. Estimating answers to word problems
c. Probability
d. Sets
e. Graphs
f. Plotting ordered pairs, Cartesian planes
g. Finding median
h. Working with tables and schedules
i. Working with maps and scale drawings

EXPLANATION OF SYMBOLS

This sample page and notations explain the format, headings, and symbols used throughout the document.

left hand column states the objective in general terms, indicating its scope and level of difficulty

right hand column gives a specific example of what students should be able to do once taught the objective

level and headings covered on this page

objective number under the D. heading; this is the 13th objective in Decimals and Percent

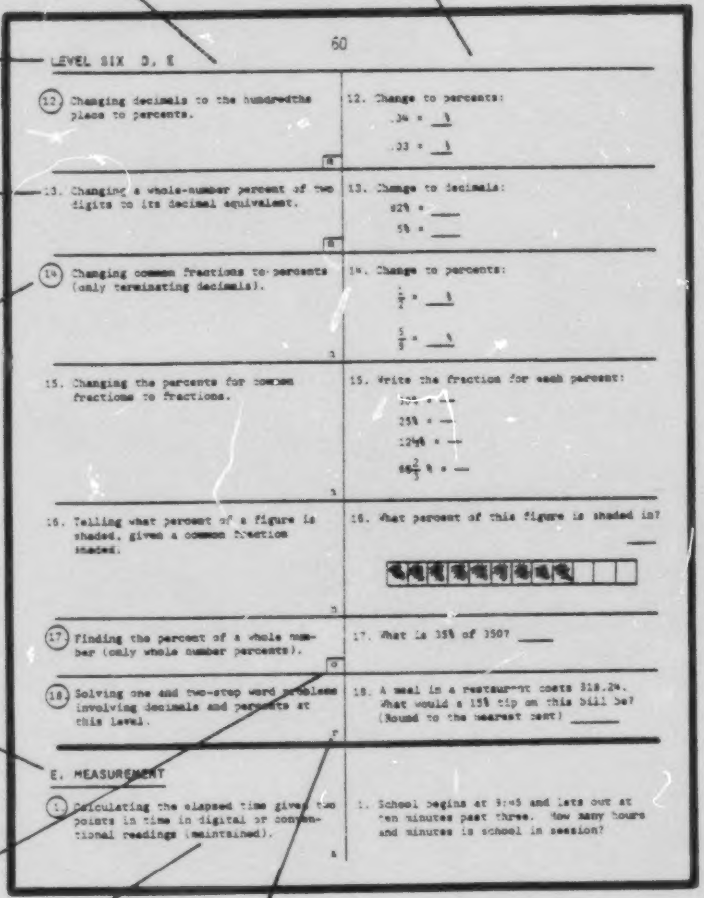
circled objectives are priority skills endorsed as minimum essentials by teachers and/or leading to State Basic Skills at the secondary level

a new heading within Level Six

a boxed lower case letter means that this strand is introduced for the first time at this level; see Vertical Skills List beginning on page ix for a complete list of strands

maintained means that this objective is continued at the same level of difficulty from the previous level or levels

an unboxed strand letter means that this strand is extended or continued from a previous level; these strand letters are intended to make it easier for teachers to trace skills back to previous levels or ahead to higher levels



60

LEVEL SIX D, E

⑫ Changing decimals to the hundredths place to percents. $\boxed{a}$	12. Change to percents: .34 = __% .03 = __%
13. Changing a whole-number percent of two digits to its decimal equivalent. $\boxed{a}$	13. Change to decimals: 82% = ____ 5% = ____
⑭ Changing common fractions to percents (only terminating decimals). a	14. Change to percents: $\frac{1}{2}$ = __% $\frac{5}{8}$ = __%
15. Changing the percents for common fractions to fractions. a	15. Write the fraction for each percent: 50% = — 25% = — 12½% = — $66\frac{2}{3}$% = —
16. Telling what percent of a figure is shaded, given a common fraction shaded. a	16. What percent of this figure is shaded in? ____ ▨▨▨▨▨▨▨▨▨□□□
⑰ Finding the percent of a whole number (only whole number percents). $\boxed{c}$	17. What is 35% of 350? ____
⑱ Solving one and two-step word problems involving decimals and percents at this level. r	18. A meal in a restaurant costs $18.24. What would a 15% tip on this bill be? (Round to the nearest cent) ______

E. MEASUREMENT

① Calculating the elapsed time given two points in time in digital or conventional readings (maintained). a	1. School begins at 9:45 and lets out at ten minutes past three. How many hours and minutes is school in session?

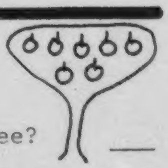
MATHEMATICS OBJECTIVES

The following one hundred pages list the objectives which students working at each level should ideally have mastered by the end of the year. The objectives with the highest priority are circled.

33 objectives
33 circled

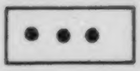
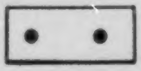
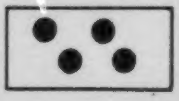
K I N D E R G A R T E N

A. NUMBERS AND NUMERATION

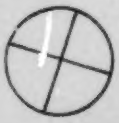
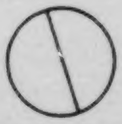
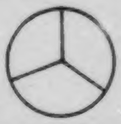
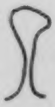
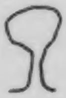
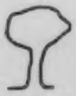
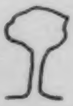
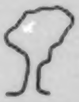
① Counting one to twenty objects.	a	1. How many apples are in the tree?  ___
② Writing numerals from one to twenty.	a	2. Write the numeral for eleven in the circle. ○
③ Matching numbers with corresponding sets of objects up to twenty.	b	3. Draw a line from the numeral to the same number of circles: ○ ○ ○ ○ ○ ○ ○ 12 ○
④ Finding ordinal position from first to fifth.	e	4. Fill in the fifth box in this row: → ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
⑤ Counting backward from ten to one.	f	5. Fill in the missing numbers: 10, 9, 8, __, __, __, __
⑥ Determining one more than or one less than a number under twenty.	g	6. What is one less than 8? ___ What is one more than 16? ___
⑦ Identifying which two groups in a larger group have an equal number of objects (one-to-one correspondence).	h	7. Circle the two boxes that have the same number of dots: [● ● ●] [● ●] [● ● ●] [● ● ● ●]
⑧ Identifying which of two groups of objects has more and which has less.	h	8. Circle the box that has more dots in it: [● ● ● ● ● ●] [● ● ● ● ●]
⑨ Knowing number sequence from one to twenty.	k	9. What are the next two numbers? 11, 12, 13, ___, ___ Circle the number that is out of order: 4, 5, 3, 6, 7, 8

KINDERGARTEN B, C, D

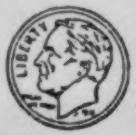
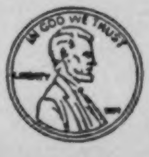
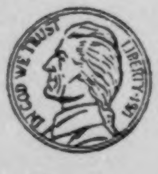
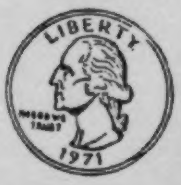
B. COMPUTATION

① Combining two groups of objects and telling how many objects there are in all. b	1. There are three dots in one box and two dots in the other. How many dots are there all together in both boxes? ___  
② Finding the number of objects remaining when some are taken away. c	2. There are four balls in the box. If you take away two, how many will be left in the box? ___ 
③ Identifying objects that come in pairs. e	3. Circle which of these usually come in pairs: cows mittens houses trains
④ Identifying the older or younger of two children under ten. s	4. Suzy is 4 years old. Joe is 5 years old. Which child is older? ___

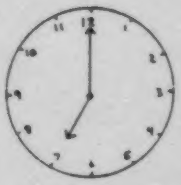
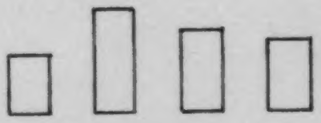
C. FRACTIONS

① Identifying a figure that has been cut in half. a	1. Circle the pizza that is divided in half.   
② Identifying the middle object in an odd-numbered row. a	2. Circle the tree that is in the middle:     

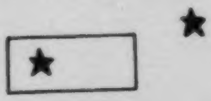
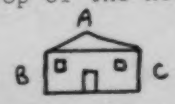
D. DECIMALS AND PERCENT (readiness)

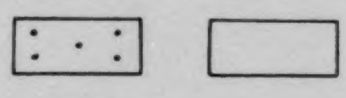
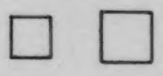
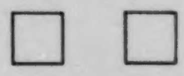
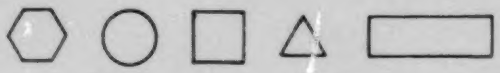
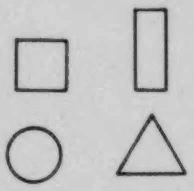
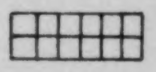
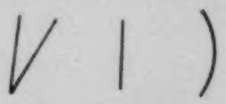
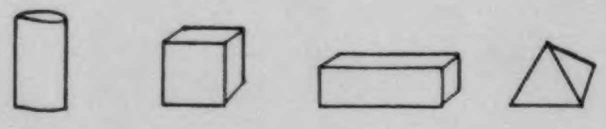
① Identifying a penny, nickel, dime, and quarter given real coins or pictures. a	1. Circle the penny. Put an X on the quarter.    

E. MEASUREMENT

① Telling time from a clock face reading exactly on the hour.	a	1. What time does this clock say? - one o'clock - seven o'clock - three o'clock - eleven o'clock 
② Identifying whether before or after is the appropriate word in an everyday situation.	b	2. Circle the right word: Breakfast comes (before/after) lunch.
③ Visually comparing objects and telling which is largest, smallest, longest or tallest, and shortest.	d	3. Which is tallest? Circle it. 
④ Visually comparing the contents or cups or jars and telling which holds most, more, or less (only containers similar size and shape).	f	4. Which glass has the least grape juice? Circle it.
⑤ Identifying a clock or watch as an instrument to tell time.	i	5. Circle what you use to tell time: clock ruler thermometer scale
⑥ Identifying hours as a measure of time.	j	6. Circle the one you would use to tell how long a girl sleeps: 10 hours 10 feet 10 pounds

F. GEOMETRY

① Identifying whether an object is outside or inside a shape.	a	1. Which star is inside the box? Circle it. 
② Identifying top, bottom, and middle.	a	2. Which letter is on top of the house? Circle it. 

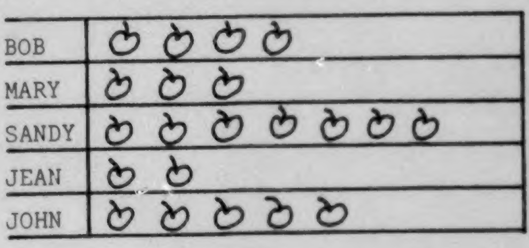
③ Copying a simple pattern of dots.	a	3. Copy the pattern of dots into the empty box. 
④ Identifying which of two objects is larger or smaller.	a	4. Circle the square that is larger. 
⑤ Knowing left and right.	a	5. Fill in the square that is on the left. 
⑥ Matching a two-dimensional shape with an identical one mixed in with other shapes.	f	6. Fill in the shape that is the same as this one: △ 
⑦ Identifying circles, squares, triangles, and rectangles.	g	7. Which shape is a circle? Which is a triangle? Which is a square? Which is a rectangle? 
⑧ Counting area squares in a rectangle or square with twelve or fewer units.	k	8. How many small squares are there in this rectangle? 
⑨ Identifying straight and curved lines.	l	9. Which line is a curve? Circle it. 
⑩ Matching common geometric solids with everyday objects.	n	10. Circle the shape that looks like a tonic can. 

G. ESTIMATING, GRAPHS, ETC.

① Reading a simple picture graph.

e

1. This graph shows how many apples these children ate in a week. Who ate the most apples? ________



53 objectives
43 circled

LEVEL ONE

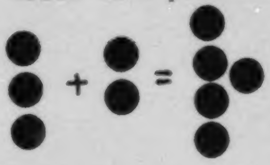
A. NUMBERS AND NUMERATION

① Writing numerals from zero to ninety-nine. a	1. Write seventy-five in numerals: ___
② Identifying other ways of writing a given number up to ninety-nine. b	2. Circle other ways of naming 8: 4+4 2+2 eighty eight 9-1 seven
③ Identifying place value to the tens place. c	3. The number 56 has ___ tens and ___ ones.
④ Finding ordinal position from first to tenth. e	4. Fill in the eighth circle in this row, starting from the left. ○ ○ ○ ○ ○ ○ ○ ○ ○
⑤ Counting backward from twenty to one. f	5. Write the numbers from 17 to 10, counting backwards: 17, ___, ___, ___, ___, ___, ___, 10
⑥ Writing the number before or after a given number, or the number between two numbers, up to ninety-nine. g	6. What number comes just before 87? ___ ...just after 45? ___ ...between 34 and 36? ___
⑦ Using the symbols for greater than (>), less than (<), and equal to (=) to compare pairs of numbers. h	7. Put the correct sign between each pair of numbers: > < = 4 5 2 2 9 6
⑧ Skip counting by twos to twenty, fives to fifty, and tens to one hundred. k	8. Fill in the next two numbers in each line: 2, 4, 6, ___, ___ 15, 20, 25, ___, ___ 40, 50, 60, ___, ___
⑨ Identifying odd and even numbers one to ten. l	9. Circle the odd numbers: 3 4 5 6 7 Circle the even numbers: 5 6 7 8 9

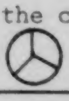
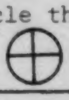
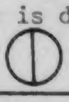
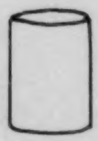
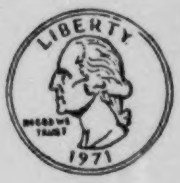
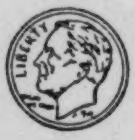
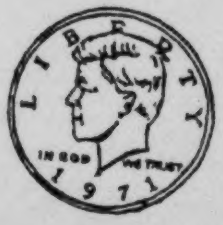
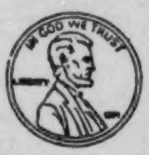
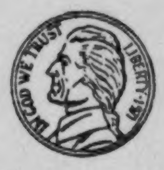
B. COMPUTATION

① Memorizing addition facts to ten. a	1. 4 + 0 = ___ $\begin{array}{r}3\\+5\\\hline\end{array}$

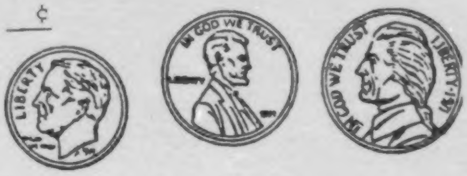
LEVEL ONE B

② Memorizing subtraction facts to ten.	a	2. 4 - 2 = ___ 8 -5
③ Adding two 2-digit numbers or one 2-digit and one 1-digit number with no regrouping.	b	3. 43 +21 50 + 4
④ Adding three numbers written in vertical or horizontal format, the sum less than twelve.	b	4. 4 + 3 + 2 = ___ 3 1 +5
⑤ Subtracting 2-digit numbers or a 1-digit from a 2-digit number with no regrouping.	c	5. 38 -24 15 - 4
6. Adding and subtracting from right to left (in preparation for regrouping at level two).	c	6. In these problems, circle the numbers you add or subtract first: 26 +13 52 -31
7. Solving addition problems involving up to three of the same number under four.	d	7. 2 + 2 + 2 = ___ 3 + 3 + 3 = ___
⑧ Dividing an even-numbered row of objects into pairs.	e	8. Divide this row of triangles into five pairs by circling the pairs: ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲
9. Applying the principle that the addends in addition problems can be reversed and still give the same sum.	j	9. Circle the addition that has the same answer as 3 + 5 (you don't have to work out the answer!): 5 + 6 3 + 2 5 + 3 5 + 2
10. Writing addition and subtraction equations for picture problems.	n	10. Write this problem in numerals:  ___ + ___ = ___
11. Finding the missing addend in an open number sentence, the sum under ten.	o	11. 3 + ___ = 8

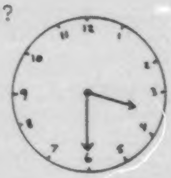
LEVEL ONE B, C, D

12. Finding the missing subtrahend in an open number sentence of 1-digit numbers. o	12. 7 - ___ = 5
⑬ Solving simple word problems involving addition and subtraction with answers up to ten. s	13. Bob had 3 pennies. He found 5 more pennies. How many pennies did he have then? ___
C. FRACTIONS	
① Identifying a whole, half, third, and fourth of an object. a	1. Put a check by the circle that is divided into thirds:   
2. Estimating half the capacity of a container. a	2. Draw a line about half way up this glass: 
3. Dividing an even-numbered row of ten or fewer objects into two equal groups. a	3. Draw a line that divides this row of balls into two equal groups (in half): ○ ○ ○ ○ ○ ○ ○ ○
D. DECIMALS AND PERCENT (readiness)	
① Matching the names of coins (pennies, nickels, dimes, quarters, and half dollars) with pictures. a	1. Draw a line from the picture of each coin to its name.      penny nickel dime quarter half dollar

LEVEL ONE D, E

② Knowing the exchange rate between pennies, nickels, and dimes. a	2. How many pennies are there in a dime? ___ How many nickels are there in a dime? ___
③ Finding the value of two or three coins worth less than twenty cents, answers in cents notation (¢). h	3. How many cents are these coins worth all together? ___¢ 
4. Calculating change from 25 cents, no regrouping. r	4. Tom bought a toy for 12 cents. He paid for it with a quarter. How much change should he get? ___¢

E. MEASUREMENT

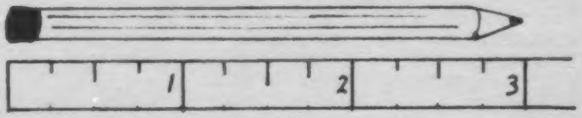
① Telling time from a clock face reading on the hour or half hour. a	1. What time does this clock say? - four o'clock - six thirty - three thirty 
② Identifying the sequence of morning, noon, afternoon, evening, night, midnight. b	2. Circle the one that belongs in the space: Morning, noon, afternoon morning night
③ Identifying the order of the days of the week. c	3. Circle the day that comes right after Tuesday: Thursday Sunday Wednesday
④ Identifying the order of the months of the year. c	4. Circle the month that comes right after April: June May September
⑤ Identifying the order of the seasons. c	5. Circle the season that comes right after summer: winter spring fall

LEVEL ONE E, F

⑥ Judging the length of an object exactly two or three inches long held up against a drawing of a ruler.

d

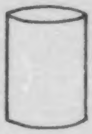
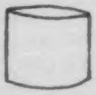
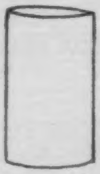
6. How long is the pencil?
1 inch
2 inches
3 inches



⑦ Comparing the capacity of several cylindrical containers with the same diameter.

f

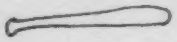
7. Circle the can that will hold the most water.

⑧ Comparing everyday objects and judging which is heavier or lighter.

g

8. Which is lighter: a baseball or a wooden baseball bat? Circle the one that is lighter.



⑨ Comparing temperature of the seasons and judging which is hotter or colder, hottest or coldest.

h

9. Circle the season that is hottest:
summer winter spring fall

⑩ Identifying a clock or watch as an instrument to tell time and a ruler as an instrument to measure distance.

i

10. Draw a line to the correct instrument:

To tell time-	-ruler
	-thermometer
	-scale
To measure a line-	-clock

⑪ Identifying appropriate units of time (hours and minutes) and linear measure (feet and inches).

j

11. Circle the unit you would use to measure:

How long a nap lasts:
feet
pounds
minutes

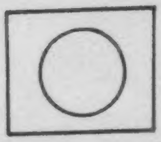
How long a boy's shoe is:
hours
inches
pounds

F. GEOMETRY

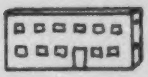
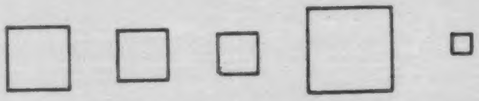
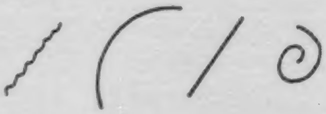
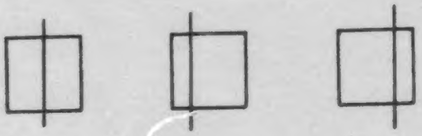
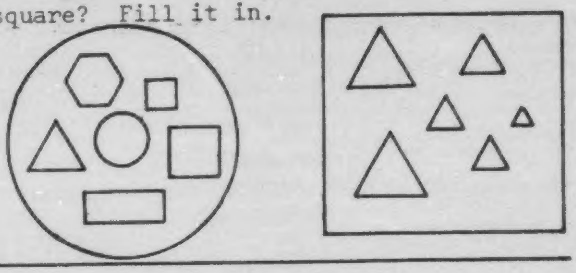
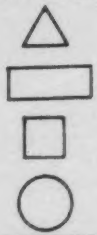
① Identifying the inside and outside of a closed region.

a

1. Put an X inside the circle.



LEVEL ONE F

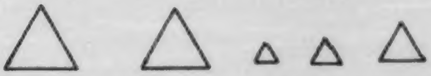
② Writing a letter on, above, or below a point of reference. a	2. Write an X above the house. 
③ Identifying the largest or smallest object in a group. a	3. Fill in the smallest square. Circle the largest square. 
④ Identifying straight and curved lines. b	4. Circle the line that is straight. 
5. Identifying figures with a line of symmetry drawn through them, expressed in terms of cutting the figure in half. d	5. Which square is cut in half by a line? Circle it. 
⑥ Picking a shape that is similar out of a group of other shapes. f	6. Which shape inside the big circle belongs with the shapes in the big square? Fill it in. 
⑦ Identifying a square, rectangle, triangle, and circle. g	7. Draw a line from the name of each shape to the shape: circle triangle square rectangle 
⑧ Relating the four basic shapes to everyday objects. g	8. Which has the same shape as a circle: the sun a house a door

LEVEL ONE F, G

⑨ Matching shapes with the same size (congruent figures).

h

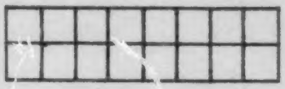
9. Which triangle is the same size as this one: △ Circle it.



⑩ Counting small squares in a larger square or rectangle (twenty units or less).

k

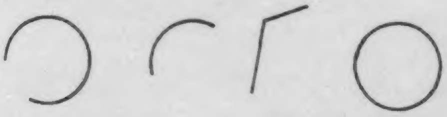
10. How many small squares are there in this figure? ____



⑪ Recognizing a closed curve and an open curve.

l

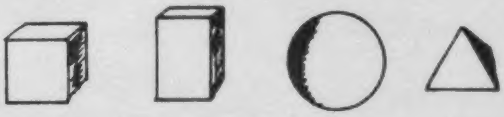
11. Put a check by the closed curve.



⑫ Identifying a drawing of a common geometric solid that looks like an everyday object.

n

12. Which of these is shaped like a box of cereal? Circle it.



G. ESTIMATING, GRAPHS, ETC.

① Getting information from or partly filling in a simple picture graph.

e

1. This graph shows how many marbles some children collected.

Beth	●●●●●●●●●
Laura	●●●●●●●●●●●
Sam	●●●●●●●
Billy	●●●●●●●●●●●●●●●

How many marbles did Laura collect? __

Who collected the fewest? ________

57 objectives
49 circled

L E V E L T W O

A. NUMBERS AND NUMERATION

① Writing numerals from zero to nine hundred ninety-nine.	a	1. Write four hundred thirty-two in numerals: ______
② Identifying other ways of writing a given number up to ninety-nine.	b	2. Circle other ways of naming 16: sixty 4+4+4+4 sixteen 17-1 3+3+3+3
③ Identifying place value to the hundreds place.	c	3. 267 has __ hundreds, __ tens, __ ones.
④ Using ordinal numbers from first through twentieth.	e	4. Fill in the twelfth triangle from the left: △△△△△△△△△△△△△△△△△△
5. Counting backward from any number under one hundred.	f	5. Write the numbers counting backward from 82: 82, ___, ___, ___, ___, ___, ___, ___
⑥ Writing the number before or after a given number, or the number between two numbers, from zero to nine hundred ninety-nine.	g	6. What number comes just before 821? ____ ...just after 700? ____ ...between 520 and 522? ____
⑦ Comparing numbers using greater than (>), less than (<), and equal to (=) signs.	h	7. Write the correct symbol between each pair of numbers: > < = 25 56 72 69 65 65
⑧ Skip counting by twos, fives, and tens to one hundred, and by hundreds to one thousand.	k	8. Write the next three numbers in each row: 55, 60, 65, ___, ___, ___ 42, 44, 46, ___, ___, ___ 300, 400, 500, ____, ____, ____
⑨ Identifying odd and even numbers one to twenty.	l	9. Circle the odd numbers: 15 16 17 18 Circle the even numbers: 11 12 13 14

LEVEL TWO B

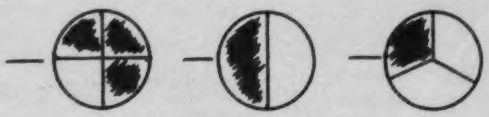
B. COMPUTATION

① Memorizing addition and subtraction facts to eighteen. a	1. 4 + 9 = ___ 17 - 8 = ___ 6 +8
② Adding a 1- and a 2-digit number and two 2-digit numbers with regrouping. b	2. 38 + 5 46 +27
③ Adding three 1-digit numbers written vertically or horizontally. b	3. 8 5 +7 3 + 8 + 1 = ___
④ Subtracting a 1- from a 2-digit number with regrouping. c	4. 23 - 4
⑤ Subtracting two 2-digit numbers with regrouping. c	5. 91 -13
⑥ Adding the same number several times, sums under eighteen. d	6. 3 + 3 + 3 + 3 + 3 = ___
⑦ Dividing a row of objects into pairs or groups of three (no remainders). e	7. How many groups of 3 can you circle in this row? ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ___
⑧ Checking for errors in addition and subtraction problems at this level. f	8. Circle the mistake in one of these: 14 +15 29 44 -25 29
9. Finding ten greater than and ten less than a given number under eighty-nine. i	9. What is 10 more than 26? ___ What is 10 less than 79? ___
10. Applying the principle that the addends in addition problems can be reversed without changing the sum. j	10. Circle the additions that have the same answer as 34 + 46 (you don't have to work out the answer!): 24 + 14 46 + 75 46 + 34
11. Writing addition and subtraction equations for simple word problems. n	11. Gloria has 10 pennies. She gets 5 more pennies from a friend. Now she has 15 pennies. Write a number sentence for what happened: ___ + ___ = ___

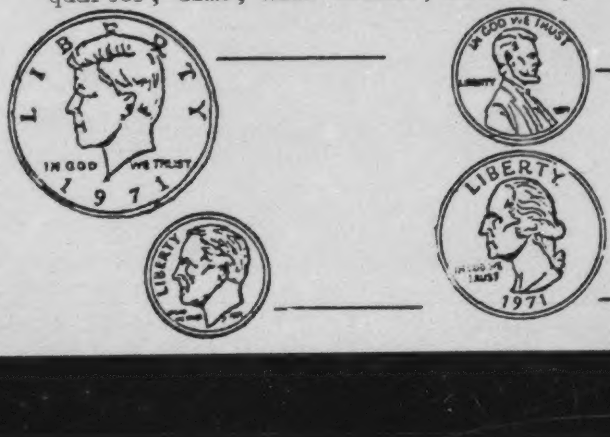
LEVEL TWO B, C, D

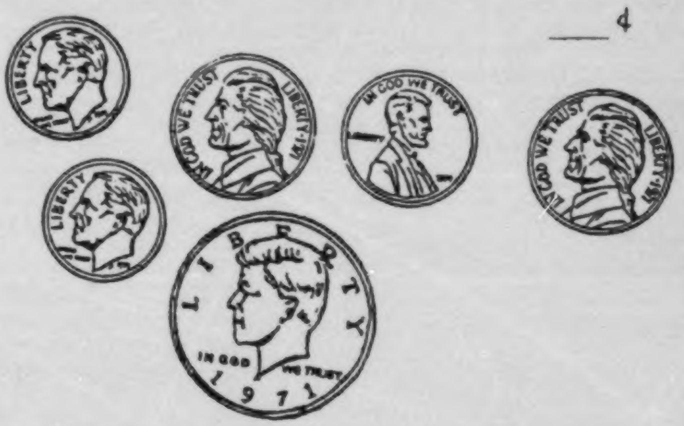
12. Finding the missing addend in an open number sentence, the sum less than twenty. o	12. 11 + ___ = 19
13. Finding the missing subtrahend in an open number sentence, numbers under twenty. o	13. 17 - ___ = 7
⑭ Solving word problems involving addition and subtraction at this level. s	14. A woman bought 16 oranges. She gave 5 to her next door neighbor. How many oranges did she have left? ___

C. FRACTIONS

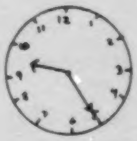
① Writing fraction numbers for fraction words: one half, one third, two thirds, one fourth/quarter, and three fourths/quarters a	1. Write the fraction numbers for each: one third — one fourth — one half — three fourths —
② Writing the correct fraction for the shaded region of a figure (same fractions as above). a	2. Write what fraction of each circle is shaded in: 
③ Finding one half of an even-numbered row of up to twenty objects. a	3. Draw a line half way along this row, so the balls are divided into two equal groups. ● ● ● ● ● ● ● ● ● ● ● ● ● ●

D. DECIMALS AND PERCENT (readiness)

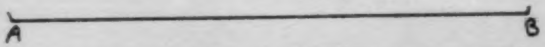
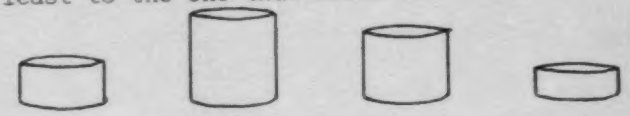
① Writing the names of coins, given pictures and a list. a	1. Write the name of each coin on the line beside it. Choose from this list: quarter, dime, half dollar, nickel, penny 

② Reading and writing money expressions under one dollar, using the cents sign (¢). b	2. Write in numerals with a cents sign: fifty-nine cents ____ eighty cents ____
③ Finding the value of several coins whose value does not exceed one dollar. h	3. How much money are all these coins worth? ____¢ 
④ Solving simple word problems involving computing change for purchases of items under one dollar paid for with an amount of money under one dollar. r	4. Betty bought a candy bar for 15¢. She paid for it with a half dollar. How much change should she get? ____¢

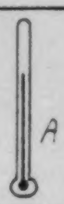
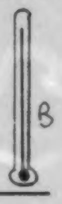
E. MEASUREMENT

① Telling time from a clock face whose minute hand is on any five-minute mark. a	1. What time does this clock say? - quarter to five - twenty-five past nine - nine thirty 
② Telling time from a digital clock reading on any five-minute mark. a	2. What time does this digital clock say? 10:05 - five past ten - ten past five - five past one
③ Identifying A.M. and P.M. as abbreviations for morning and afternoon/evening. a	3. Is 9 A.M. nine in the morning or nine in the evening? Circle one.

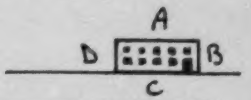
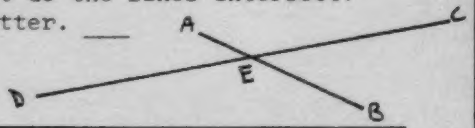
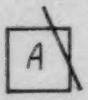
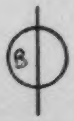
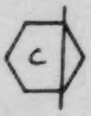
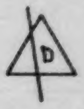
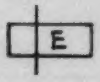
LEVEL TWO E

<table>
<tr><td>④ Comparing the basic units of time: hours, minutes, and seconds, days and weeks, months and years.
b</td><td>4. Circle the unit of time that has more time:
- minute or second
- minute or hour
- day or hour
- day or week
- year or month</td></tr>
<tr><td>⑤ Knowing the order of the days of the week.
c</td><td>5. What day comes after Tuesday? Circle one:
Friday Sunday Wednesday</td></tr>
<tr><td>⑥ Knowing the order of the seasons.
c</td><td>6. What season comes after winter?
spring summer fall</td></tr>
<tr><td>⑦ Naming any month given its number in order.
c</td><td>7. What is the fifth month?
January December April May</td></tr>
<tr><td>⑧ Naming the day of the week on a calendar, given the date.
c</td><td>8. What day is January 5th on this calendar?
Sunday Monday Tuesday Friday
JANUARY
<table>
<tr><th>Sun.</th><th>Mon.</th><th>Tue.</th><th>Wed.</th><th>Thu.</th><th>Fri.</th><th>Sat.</th></tr>
<tr><td></td><td></td><td></td><td></td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td></tr>
<tr><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td></tr>
<tr><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td>31</td></tr>
</table></td></tr>
<tr><td>⑨ Using a ruler to measure a line segment that is exactly one, two, three, four, etc. inches long.
d</td><td>9. Use your ruler to measure this line from A to B. How long is it? ___ inches.
 </td></tr>
<tr><td>⑩ Arranging four cylindrical containers with the same diameter in order of capacity.
f</td><td>10. Number these from the one that holds the least to the one that holds the most.
</td></tr>
<tr><td>⑪ Comparing the basic units of weight - ounces, pounds, and tons - with everyday objects.
g</td><td>11. Draw a line from each object to the unit of weight that would best measure it:
- a shoe -an ounce
- a large boulder -a pound
- six pencils -a ton</td></tr>
</table>

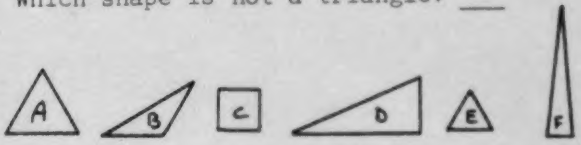
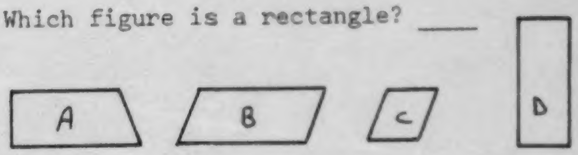
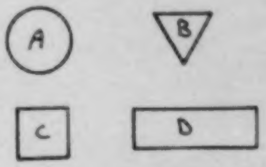
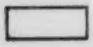
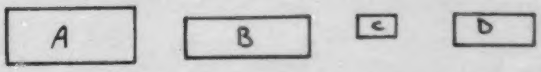
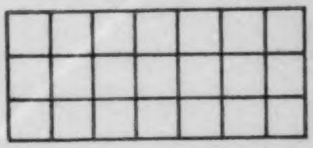
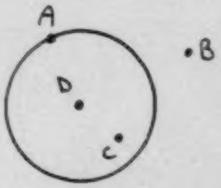
LEVEL TWO E, F

⑫ Understanding that the higher the reading on a thermometer, the warmer the temperature is, and the lower the reading, the cooler it is. h	12. Which thermometer shows a warmer temperature? ___  
⑬ Identifying the function of a clock or watch, a ruler, a thermometer, a scale, and a measuring cup. i	13. Draw a line from each instrument of measurement to what it is used for: a clock -weighing things a ruler -telling temperature a thermometer -measuring distance a measuring cup -telling time -measuring milk a scale
⑭ Identifying the best unit of measure within each area (e.g. inches, feet, or yards in linear measurement). j	14. What would be the best unit of measurement for weighing an elephant? ounces pounds tons What would be the best unit of measurement for timing a 50-yard dash? seconds minutes hours
⑮ Estimating length, weight, and time. l	15. About how long is a baseball bat: 3 feet 3 yards 3 miles

F. GEOMETRY

① Identifying upper, lower, left, and right. a	1. Which letter is on the upper side? ___ Which letter is to the right? ___ 
② Identifying the point where two lines intersect. b	2. At what point do the lines intersect? Write the letter. ___ 
3. Identifying figures with a line of symmetry drawn through them, expressed in terms of being cut in half (maintained).	3. Which figure is cut in half by a line? ___     

LEVEL TWO F

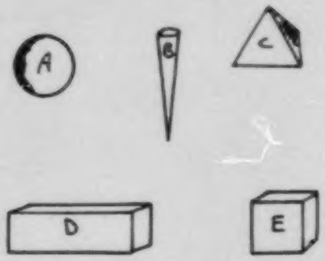
④ Classifying shapes by the number of sides. f	4. Which shape is not a triangle? ___ 
5. Identifying a rectangle and a square in a set of quadrilaterals. f	5. Which figure is a rectangle? ___ 
⑥ Identifying basic shapes: square, circle, rectangle, triangle (maintained). g	6. Write the letter of each shape by its name: triangle ___ square ___ rectangle ___ circle ___ 
⑦ Relating the four basic shapes to everyday objects (maintained). g	7. Which has the same shape as a rectangle? a clock a door a pizza
⑧ Matching shapes of the same size (congruent). h	8. Which rectangle is the same size as this one:  ___ 
⑨ Counting small squares (finding the area) of a rectangle or square (thirty units or fewer). k	9. How many small squares are there in this figure? ___ 
⑩ Identifying the center of a circle. l	10. Which point is at the center of the circle? ___ 

LEVEL TWO F, G

(11.) Relating six geometric solids (sphere, cone, cube, cylinder, pyramid, and rectangular solid) to everyday objects.

n

11. What does each drawing look like? Write the letter of the shape beside the object that has the same shape.



___ a baseball
___ a juice can
___ a shoe box
___ an ice cube
___ an ice cream cone
___ a tent

G. ESTIMATING, GRAPHS, ETC.

(1.) Getting and using information from, and filling information into, simple picture graphs.

e

1. This graph shows how many baseball cards several children collected.

Sam	▯▯▯▯▯▯▯▯▯
Charlie	▯▯▯▯
Eve	▯▯▯▯▯▯▯▯▯▯▯▯▯
Chris	▯▯▯▯▯▯▯

How many more cards does Sam have than Chris? ___

62 objectives
51 circled

LEVEL THREE

A. NUMBERS AND NUMERATION

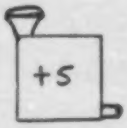
① Writing numerals from zero to nine thousand nine hundred ninety-nine. a	1. Write seven thousand two hundred eighty-one in numerals: ________
② Identifying other ways of writing a given number up to nine hundred ninety nine. b	2. Circle other ways of naming 112: 100 + 12 one hundred twenty-one 114 - 2 one hundred twelve
③ Identifying place value to the thousand place. c	3, 8,035 has ___ thousands, ___ hundreds, ___ tens, and ___ ones.
4. Writing ordinal numbers from first to one hundredth, given an example. e	4. Write the ordinal number for each (the first is done for you): 10 - tenth 25 - ________ 47 - ________
⑤ Writing the numeral that comes before or after a given number or between two numbers, from zero to nine thousand nine hundred ninety-nine. g	5. What number comes just before 9,000? _____ What number comes just after 6,300? _____ What number is between 1,000 and 1,002? _____
⑥ Using the symbols for greater than (>), less than (<), and equal to (=) to write simple expressions. h	6. Write each expression using numbers and the correct symbol: Four is equal to four ________ Twelve is greater than two ________ Six is smaller than nine ________
⑦ Skip counting by twos, threes, fours, fives, tens, and twenty-five to one hundred, by hundreds to one thousand, and by thousands to ten thousand. k	7. Write the next three numbers in each row: 25, 50, 75, ___, ___, ___ 200, 300, 400, ____, ____, ____ 3000, 4000, 5000, _____, _____, _____
⑧ Identifying odd and even numbers from one to one hundred. l	8. Circle the odd numbers: 66 35 89 92 Circle the even numbers: 21 55 66 98

LEVEL THREE B

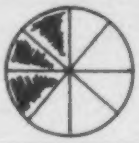
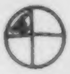
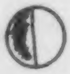
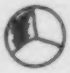
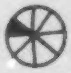
B. COMPUTATION

1. Memorizing multiplication facts through 9 x 9.	a	1. 8 x 7 = ___ 5 x 0 = ___
2. Memorizing division facts through 81 ÷ 9.	a	2. 63 ÷ 7 = ___ 45 ÷ 9 = ___
3. Adding numbers with up to three digits with regrouping, written vertically.	b	3. 203 473 +218
4. Adding two 1-, 2-, or 3-digit numbers written vertically or horizontally (if horizontal, students need to stack numbers up correctly).	b	4. 35 + 118 = ____
5. Subtracting 3-digit numbers with regrouping, written vertically.	c	5. 714 -293
6. Multiplying 3-digit numbers by 1-digit numbers with regrouping, written vertically.	d	6. 160 x 4
7. Multiplying three 1-digit numbers, written horizontally.	d	7. 4 x 2 x 3 = ___
8. Dividing 2-digit numbers by 1-digit numbers with remainders, written in division format.	e	8. $6\overline{)43}$
9. Checking for errors in computation at this level.	f	9. Circle the error or errors, if any: 479 +221 = 601 890 -137 = 753 125 x 7 = 875 $9\overline{)71}$ = 6 r.4
10. Finding ten or a hundred more than or less than a given number.	i	10. What is 10 less than 633? ____ What is 100 more than 382? ____
11. Multiplying 1- and 2-digit numbers by ten or one hundred by adding one or two zeroes.	i	11. 4 x 100 = ____ 77 x 10 = ____
12. Applying the inverse relationship between multiplication and division.	j	12. ___ x 5 = 30 30 ÷ ___ = 5

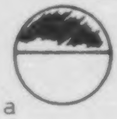
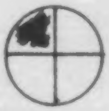
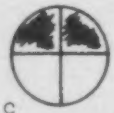
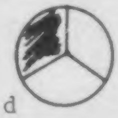
LEVEL THREE B, C

13. Writing a closed number sentence for a word problem. n	13. David delivered 25 newspapers every day. In one week (7 days) he delivered 175 newspapers. Write a closed number sentence for this story: ______________
14. Finding the missing subtrahend in 2-digit subtraction problems with regrouping, written vertically. o	14. Fill in the missing number: $\begin{array}{r}36\\-\underline{\quad\;}\\18\end{array}$
15. Solving simple function problems, given a drawing of a function machine and a one-step rule. $\boxed{q}$	15. Every number that is put into this function machine has 5 added to it. What will come out the bottom if you put in: 2 ____ 6 ____ 10 ____ 
⑯ Solving word problems involving basic computation at this level. s	16. John shovelled snow after a blizzard. He made 12 dollars on Monday and 14 dollars on Tuesday. How much did he make all together? _____

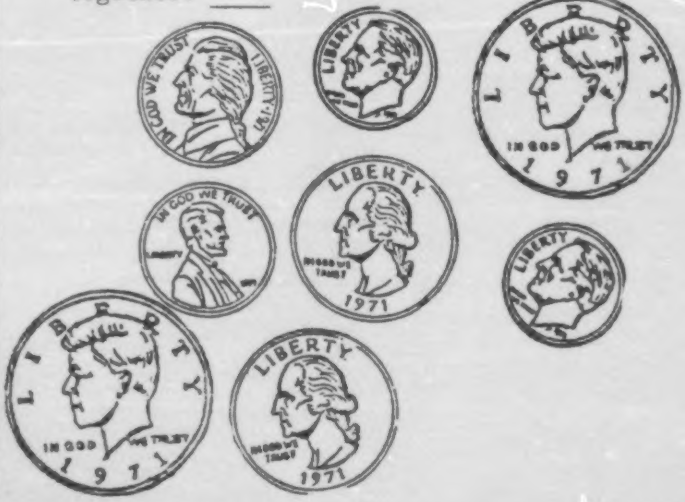
C. FRACTIONS

① Writing fractions up to eighths for shaded parts of figures. a	1. What fractional part of the circle is shaded in? ___ 
② Arranging unit fractions in order of size, given drawings of each fraction. $\boxed{b}$	2. Write these fractions in order from the smallest to the largest. $\frac{1}{4}$  $\frac{1}{2}$  $\frac{1}{3}$  $\frac{1}{8}$  ___ ___ ___ ___
③ Identifying fractions equal to one whole. $\boxed{c}$	3. Circle the fractions that are equal to one whole: $\frac{7}{8}$ $\frac{5}{5}$ $\frac{4}{3}$ $\frac{2}{2}$ $\frac{1}{2}$

LEVEL THREE C, D

④ Identifying equivalent fractions, using drawings of objects divided into halves, thirds, or quarters. e	4. Which two have the same fraction shaded in? _____  a  b  c  d
5. Identifying the numerator and denominator in any common fraction. j	5. In the fraction $\frac{7}{8}$ the ___ is called the denominator and the ___ is called the numerator.
6. Identifying the meaning of a common fraction in terms of parts of a whole or of a group. j	6. The fraction $\frac{7}{8}$ means: - eight pieces out of seven - seven pieces out of seven - seven pieces out of eight - seven pieces out of one
⑦ Solving simple word problems involving fractions at this level. l	7. A woman cuts a pie into eight equal pieces. She then eats seven eighths of the pie. What fraction is left? —

D. DECIMALS AND PERCENT

① Writing numerals for dollars and cents written in words (amounts under ten dollars). b	1. Write two dollars and eighty-five cents in numerals. Don't forget the decimal point and the dollar sign! _______
② Computing the value of a collection of coins worth between one and two dollars, given pictures of the coins. h	2. What is the value of all these coins together? ____ 

LEVEL THREE D, E

③ Identifying the smallest number of coins needed to make an amount of money under one dollar.

h

3. What is the least number of coins equal to 42¢? ___ pennies, ___ nickels, ___ dimes, ___ quarter

④ Adding and subtracting dollars and cents, amounts under ten dollars, written vertically.

i

4.

$$\begin{array}{r} \$5.35 \\ +\$2.42 \\ \hline \end{array} \qquad \begin{array}{r} \$5.66 \\ -\$1.25 \\ \hline \end{array}$$

⑤ Solving word problems involving computing change for purchases from a one, five, and ten dollar bill.

r

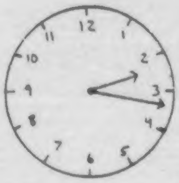
5. Mary buys a toy for $5.29. She pays for it with a ten dollar bill. How much change should she get? ________

E. MEASUREMENT

① Telling time from a clock face reading between five-minute marks.

a

1. What time does this clock say?



____

② Telling time from a digital clock reading.

a

2. What time does this digital clock say?

5:22

- twenty-two minutes before five
- two minutes past seven
- twenty-two minutes past five

③ Identifying A.M. and P.M. as abbreviations for morning and afternoon/evening (maintained).

a

3. How would you write two o'clock in the afternoon?

2:00 A.M.

2:00 P.M.

④ Using a chart of time equivalencies with abbreviations to answer questions on equivalencies.

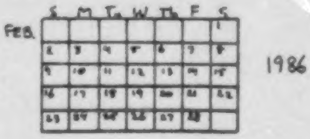
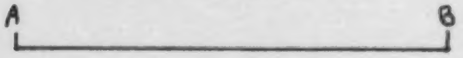
b

4. Use the chart below to answer these questions:

- How many minutes in one hour? ___
- How many years in a century? ___
- How many days in a week? ___

60 sec. = 1 min.
60 min. = 1 hr.
24 hr. = 1 day
7 days = 1 wk.
365 days = 1 yr.
366 days = 1 leap yr.
10 yr. = 1 decade
100 yr. = 1 century

LEVEL THREE E

⑤ Naming any month given its number in order (maintained).	c	5. What is the ninth month of the year? ______________
⑥ Finding a specific day or date on a calendar.	c	6. What date is the first Friday in February on this calendar? ____________ 
⑦ Telling how many days there are in each month, given the verse "Thirty days has September.."	c	7. Use the verse below to answer these questions: How many days in April? ___ How many days in July? ___ How many days in February in leap year? ___ Thirty days has September April, June, and November All the rest have thirty-one Except February with twenty-eight And twenty-nine in leap year
⑧ Using a ruler to measure a line segment whose length is exactly 1½, 2½, 3½, etc. inches long.	d	8. Use your ruler to measure the line AB. How long is it? ________ 
⑨ Using a chart of English linear equivalencies with abbreviations to answer questions on equivalencies.	e	9. Use the chart below to answer these: - How many feet in a mile? ______ - How many inches in a foot? ____ 12 in. = 1 ft. 3 ft. = 1 yd. 5280 ft. = 1 mi.
⑩ Using a chart of English capacity measurement with abbreviations to answer questions on equivalencies.	f	10. Use the chart below to answer these: - How many quarts in a gallon? - How many cups in a pint? 2 c. = 1 pt. 2 pt. = 1 qt. 4 qt. = 1 gal.

LEVEL THREE E

⑪ Using a chart of English weight measure with abbreviations to answer questions on equivalencies.

g

11. Use the chart below to answer these:

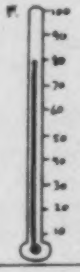
- How many pounds in a ton? ______
- How many ounces in a pound? ___

16 oz. = 1 lb.
2000 lb. = 1 tn.

⑫ Reading a Fahrenheit thermometer and giving the temperature with a degree sign.

h

12. What temperature does this thermometer show in degrees? _____



⑬ Identifying the function of a clock, watch, ruler, measuring cup, scale, thermometer, and calendar, given a list.

i

13. Write the name of the measurement instrument that would be best for each job:

- Weighing some ground beef __________
- Counting days till summer __________
- Seeing what time it is ___________
- Measuring sugar for a cake __________
- Seeing if you have a fever ___________
- Measuring a table top ____________

watch
ruler
measuring cup
scale
thermometer
calendar

⑭ Identifying the appropriate unit of measurement from a jumbled list.

j

14. What would be the best unit of measurement for each job:

- Weighing a truck ___________
- Measuring water in a pool _________
- Measuring distance to Africa ________

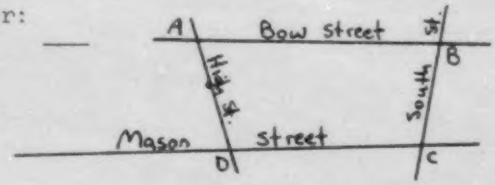
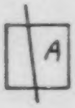
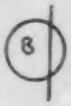
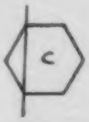
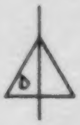
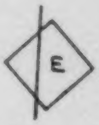
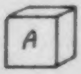
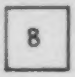
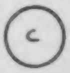
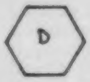
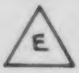
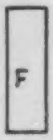
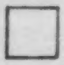
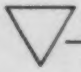
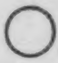
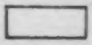
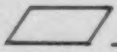
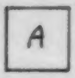
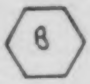
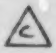
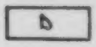
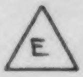
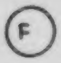
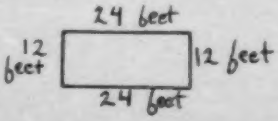
seconds
minutes
hours
days
ounces
pounds
tons
degrees
cups
pints
gallons
inches
feet
miles

⑮ Estimating length, weight, or time.

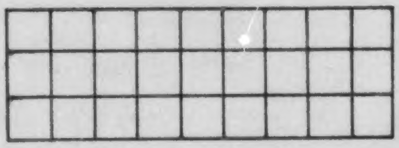
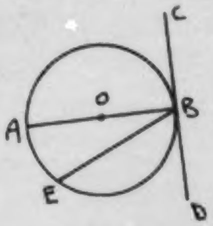
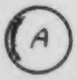
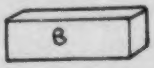
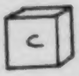
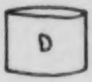
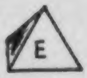
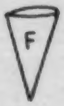
l

15. About how much does a third grade boy weigh: 12 pounds 50 pounds 3 tons

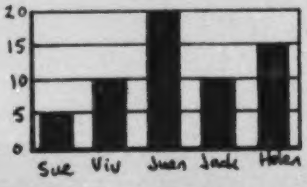
F. GEOMETRY

① Identifying the point where two streets intersect on a map. b	1. At what point does Mason Street intersect with South Street? Write the letter: ___  A Bow Street St. B Hill St. South Mason Street D C
2. Identifying a figure with a line of symmetry drawn through it, using the term symmetry. d	2. Which figure has a line of symmetry drawn through it? ___     
3. Distinguishing between flat (two-dimensional) and solid (three-dimensional) figures. f	3. Which of these figures is not flat but solid? ___      
④ Identifying basic shapes: square, rectangle, parallelogram, triangle, and circle (a list given). g	4. Write the correct name by each figure: square, rectangle, parallelogram, triangle, circle.  ________  ________  ________  ________  ________
⑤ Identifying two shapes that are similar (same shape but different size). h	5. Which two figures are similar (same shape but a different size)? ___ and ___      
⑥ Finding the perimeter of a square or rectangle, expressed in terms of the distance around the outside. j	6. How many feet is it all the way around the outside of this garden? ________ 

LEVEL THREE F, G

7. Finding the area of a square or rectangle with thirty or fewer units by counting squares or rows of squares. k	7. In the rectangle below, how many small squares are there in each row across? ___ How many rows are there? ___ Add up to see how many little squares there are in all: ___ 
8. Distinguishing a diameter from other lines crossing a circle, without using terms. l	8. Which line goes through the center of the circle? ___ 
9. Identifying six geometric solids (cube, rectangular solid, cylinder, cone, sphere, and pyramid) given drawings and a list). n	9. Write the letter of each solid beside its name: ___cone ___sphere ___cube ___cylinder ___pyramid ___rectangular solid      

G. ESTIMATING, GRAPHS, ETC.

1. Rounding off numbers to the nearest ten or hundred. a	1. Round off to the nearest ten: 57 ___ Round off to the nearest hundred: 255 ___
2. Reading and constructing picture or bar graphs. e	2. This graph shows how many states several children have visited.  How many states has Juan visited? ___ Which children have visited 10 states? ___

87 objectives
64 circled

LEVEL FOUR

A. NUMBERS AND NUMERATION

① Writing numerals to the millions place. a	1. Write six million three hundred thousand in numerals: ________
2. Using Roman numerals from one to one hundred. b	2. Write 74 in Roman numerals: ______ Write XLVIII in Arabic numerals: ___
③ Identifying place value to the millions place. c	3. 4,356, 218 has: __ ten thousands __ millions __ ones __ hundred thousands __ tens __ hundreds __ thousands
④ Sequencing whole numbers between zero and ten thousand. g	4. Write these numbers in order from smallest to largest: 4,201 2,991 4,511 1,975 4,509 ____ ____ ____ ____ ____
⑤ Skip counting by twos, threes, fours, fives, tens, one hundreds, and one thousands. beginning at any number below one million. k	5. Write the next number in each sequence: 122, 124, 126, ___ 200, 300, 400, ___ 3,445, 3,450, 3,455, ____
⑥ Identifying any number as odd or even, given a real world context. l	6. A taxi driver is looking for 4437 Maple Street. Will it be on the odd or even-numbered side of the street? ____
7. Identifying numbers divisible by 2, 3, 5, and 10. m	7. Which are divisible by 2? 24 55 208 Which are divisible by 3? 25 48 101 Which are divisible by 5? 34 50 105
8. Identifying prime and composite numbers between one and thirty. n	8. Write whether each number is prime or composite: 6 ________ 11 ________ 12 ________ 18 ________

9. Finding all numbers that divide evenly into a given number under one hundred (factors). ○	9. Which numbers divide evenly into: 15 - __________ 29 - __________ 60 - __________

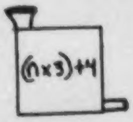
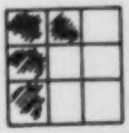
B. COMPUTATION

① Memorizing multiplication facts through 12 x 12. a	1. 8 x 7 = ___ 10 x 7 = ___ 12 x 8
② Memorizing division facts through 144 — 12. a	2. 16 ÷ 2 = ___ 81 ÷ 9 = ___ 11⟌121
③ Adding three 4-digit numbers written vertically. b	3. 8140 2037 +7955
④ Adding two 3- and 4-digit numbers written vertically or horizontally (if horizontal, students need to stack numbers up correctly). b	4. 9473 + 356 = ____ 6501 + 248
⑤ Subtracting two 4-digit numbers with regrouping, written vertically. c	5. 5603 -4291
⑥ Subtracting a 2-digit from a 3-digit number with regrouping, written vertically or horizontally (if horizontal, students need to stack numbers up correctly). c	6. 950 - 21 = ____ 442 - 43
⑦ Multiplying 3-digit numbers by 2-digit numbers, including zeroes, with regrouping, written vertically. d	7. 380 x 25
⑧ Multiplying a 2-digit number by a 1-digit number, written vertically or horizontally (if horizontal, students need to stack numbers up correctly). d	8. 6 x 43 = ____ 57 x 6

LEVEL FOUR B

⑨ Dividing 3-digit by 1-digit numbers with or without remainders, with the first digit of the dividend the same as or larger than the divisor. e	9. $7\overline{)878}$
⑩ Dividing 4-digit by 1-digit numbers with or without remainders, with the first digit of the dividend smaller than the divisor. e	10. $9\overline{)3285}$
11. Dividing 3-digit numbers by 2-digit multiples of ten with no remainders. e	11. $30\overline{)570}$
⑫ Checking for errors in computation at this level. f	12. Circle any error or errors: $\begin{array}{r}381\\91\\+\ 43\\\hline 515\end{array}$ $\begin{array}{r}200\\-\ 14\\\hline 196\end{array}$ $\begin{array}{r}130\\\times\ 81\\\hline 110\\1048\ \\\hline 10590\end{array}$ $\begin{array}{r}49\text{ r.2}\\6\overline{)295}\\24\\\hline 55\\54\\\hline 2\end{array}$
13. Identifying the sum, difference, product, and quotient as the names for answers in addition, subtraction, multiplication, and division problems. g	13. Write each name in the correct space: sum, difference, product, quotient. Answer in division __________ Answer in subtraction ____________ Answer in addition ____________ Answer in multiplication ____________
⑭ Finding the average of three 1-digit numbers (no remainders). h	14. What is the average of 8, 2, and 5? ____
15. Identifying how many times greater one multiple of ten is than another judging by the addition of a zero. i	15. 4,600 is how many times as great as 460? ____
16. Working out multiplication and division in parenthesis before adding or subtracting (order of operations). j	16. 5 + (4 x 12) = ____
17. Writing closed number sentences for a given equation. n	17. Write a closed number sentence for this equation: The sum of 5 and 7 is 12. ____________________

LEVEL FOUR B, C

18. Supplying the missing factor in 1-digit multiplication problems. o	18. 3 x ___ = 27
19. Solving function problems, given a drawing and a two-step rule. q	19. Every number that is put into this function machine is multiplied by 3 and increased by 4. What will come out if you put in:  3 ___ 6 ___ 11 ___
⑳ Solving one and two-step word problems involving computation at this level, some containing extraneous information. s	20. A 40-year-old camp counselor had 24 pieces of candy. He wanted to divide them evenly among 7 children and himself. How many pieces of candy should each person get? _____
C. FRACTIONS ① Writing the common fraction for the shaded part of a figure, up to sixteenths. a	1. What fraction of the square is shaded? — 
② Comparing the size of two common fractions using greater than (>) and less than (<) symbols (denominators under 5). (SEE C-5 BELOW) b	2. Put the correct symbol between each pair of fractions to show which is smaller and which is larger: $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{1}{2}$
③ Identifying fractions equal to one whole (maintained). c	3. Circle the fractions equal to one whole: $\frac{3}{4}$ $\frac{3}{3}$ $\frac{5}{6}$ $\frac{2}{2}$ $\frac{7}{8}$ $\frac{9}{9}$
④ Adding and subtracting common fractions with like denominators, no simplifying of answers. $\boxed{d}$	4. $\frac{1}{7} + \frac{3}{7} = —$ $\frac{3}{5} - \frac{1}{5} = —$
⑤ Renaming equivalent fractions to higher denominators (preparatory to adding and subtracting fractions with unlike denominators). e	5. $\frac{2}{3} = \frac{}{6}$

LEVEL FOUR C

⑥ Identifying fractions equivalent to one half. e	6. Which of these fractions is equal to $\frac{1}{2}$? $\frac{3}{4}$ $\frac{2}{3}$ $\frac{2}{4}$ $\frac{1}{4}$ $\frac{3}{5}$
⑦ Adding and subtracting two mixed numbers with like denominators, no regrouping or reducing. f	7. $4\frac{3}{5}$ $5\frac{2}{7}$ $-1\frac{1}{5}$ $+8\frac{3}{7}$ \____ ____
⑧ Adding a common fraction and a one-digit whole number. f	8. $\frac{5}{8} + 3 =$ ____
⑨ Writing mixed numbers as improper fractions. g	9. Write as an improper fraction: $4\frac{1}{5} = \frac{\_\_}{5}$
⑩ Writing improper fractions as mixed numbers. g	10. Write as a mixed number: $\frac{18}{5} =$ ____
11. Finding one half, one third, or one quarter of a number of objects, no remainders. h	11. What is $\frac{1}{3}$ of 15? ____ What is $\frac{1}{4}$ of 8? ____
12. Finding the least common multiple of two numbers under ten. h	12. What is the least common multiple of 3 and 5? ____
13. Finding the greatest common factor of two numbers under 100. h	13. What is the greatest common factor of 21 and 27? ____
14. Matching the terms numerator, denominator, mixed number, and improper fraction with examples of each. j	14. Write the name for each of these, using the list: $\frac{2}{3}$ ← ________ ↖ ________ $\frac{13}{5}$ ________ $2\frac{1}{8}$ ________ mixed number denominator improper fraction numerator
⑮ Solving word problems involving fractions at this level. l	15. Suzy walked $1\frac{1}{3}$ miles one day and $2\frac{1}{3}$ miles the next. How far did she walk in all? ________

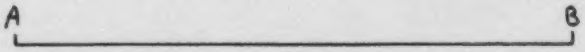
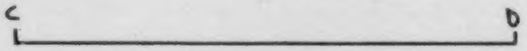
D. DECIMALS AND PERCENT

① Writing numerals for dollars and cents written in words, amounts under one hundred dollars. b	1. Write fifty-nine dollars and twenty-five cents in numerals: ____
② Writing decimals and mixed decimals to the tenths place written in words in numerals. b	2. Write seven tenths in numerals: ____ Write one and four tenths in numerals: ____
③ Given four sets of coins, identifying which one has the most money. h	3. Which is the most money? ____ How much? ____ a. 2 dimes, 1 nickel, 1 quarter, 5 pennies b. 4 dimes, 2 nickels, 6 pennies, 1 half dollar c. 2 quarters, 1 dime, 4 nickels, 14 pennies d. 3 dimes, 1 half dollar, 8 nickels, 1 penny.
④ Adding and subtracting two mixed decimals to the hundredths place, written vertically. i	4. $\begin{array}{r} 1.87 \\ +\ .45 \\ \hline \end{array}$ $\begin{array}{r} 2.81 \\ -\ .45 \\ \hline \end{array}$
⑤ Writing one quarter, one half, and three quarters of a dollar in decimal form. 1	5. Write in decimal form with a dollar sign: one half dollar ____ one quarter of a dollar ____ three quarters of a dollar ____
⑥ Converting fractions (tenths and hundredths) to decimals. 1	6. Write as decimals: $\frac{3}{10}$ = ____ $\frac{17}{100}$ = ____
⑦ Solving word problems involving addition and subtraction of decimals and money at this level. r	7. Cynthia had $10.00 in her wallet. She bought a ring for $8.95. How much change should she get? ____

E. MEASUREMENT

① Telling what time it will be a specified number of hours and minutes hence. a	1. Michael goes to bed at 9:00 PM. He wants to get 9½ hours of sleep. What time should he set his alarm clock for? ____

LEVEL FOUR E

② Calculating an amount of time remaining given two points in time in digital or conventional form. a	2. Dinner is at quarter past six. Barbara's digital watch says 5:40. How long does she have to wait until dinner? ________
③ Memorizing basic equivalencies of units of time (seconds, minutes, hours, days, years, decades, and centuries). b	3. 1 minute = ___ seconds 1 hour = ___ minutes 1 day = ___ hours 1 week = ___ days 1 year = ___ days 1 leap year = ___ days 1 year = ___ months 1 decade = ___ years 1 century = ___ years
④ Doing one-step conversions between seconds and minutes, minutes and hours, etc. b	4. 5 hours = ____ minutes 2 decades = ___ years
⑤ Memorizing the "Thirty-days has.." verse and using it to tell the number of days in each month, and the order of the months. c	5. How many days are there in January? ___ How many days in April? ___ How many in February in a non-leap year? ___ What is the seventh month? _______
⑥ Using a ruler to measure a line segment to the quarter inch. d	6. Use your ruler to measure the line AB 
⑦ Using a metric ruler to measure a line segment to the nearest millimeter. d	7. Use your metric ruler to measure the line CD. How long is it? ________ 
⑧ Memorizing basic equivalencies of English linear measurement (inches, feet, yards, miles). e	8. 1 foot = ___ inches 1 yard = ___ feet 1 mile = ______ feet
⑨ Memorizing basic equivalencies of metric linear measurement (millimeters, centimeters, meters, kilometers). e	9. 1 centimeter = ___ millimeters 1 meter = ____ centimeters 1 kilometer = ____ meters
⑩ Doing one-step conversions between inches, feet, yards, and miles. e	10. 4 feet = ___ inches 2 miles = _____ feet

LEVEL FOUR E

⑪ Memorizing basic equivalencies of English capacity measurement (cups, pints, quarts, gallons). f	11. 1 pint = __ cups 1 quart = ___ pints 1 gallon = ___ quarts
⑫ Doing one-step conversions between cups, pints, quarts, and gallons. f	12. 7 pints = ___ cups 2 gallons = ___ quarts
⑬ Memorizing basic equivalencies of English weight (ounces, pounds, tons). g	13. 1 pound = ___ ounces 1 ton = ____ pounds
⑭ Doing one-step conversions between ounces, pounds, and tons. g	14. 5 tons = ______ pounds
⑮ Memorizing the temperature of freezing and boiling water on the Fahrenheit scale. h	15. On the Fahrenheit scale, what is the freezing temperature of water? ____ What is the boiling temperature? ____
⑯ Identifying the appropriate measuring instrument for an everyday task (clock, watch, stopwatch, ruler, measuring cup, scale, thermometer, calendar, etc.) given a list. i	16. Write the name of the measurement instrument that would be best for each job: -Timing a 220-yard dash __________ -Weighing a package _________ -Telling outdoor temperature ________ (clock, watch, stopwatch, ruler, measuring cup, scale, thermometer, calendar)
⑰ Identifying the appropriate unit of measurement (including metric linear) from a jumbled list. j	17. Which unit of measurement would be best for each? -the temperature in a oven ________ -the distance to the moon (metric) __________ -your height (English) __________ (seconds, minutes, hours, days, ounces, pounds, tons, degrees, cups, pints, quarts, gallons, inches, feet, yards, miles, millimeters, centimeters, meters, kilometers)
⑱ Estimating length, weight, capacity, and time. l	18. About how much water do you think fits in a bathtub? 4 gallons 25 gallons 400 gallons

F. GEOMETRY

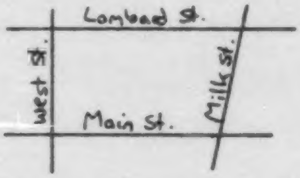
①. Identifying parallel, perpendicular, and intersecting lines on a street map.

b

1. On this map, what street runs parallel to Lombard Street? ________

What street is perpendicular to Main Street? ________

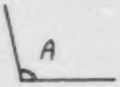
How many intersections are there? ___

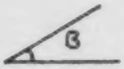


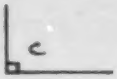
2. Identifying a right angle (marked by a square angle marker).

c

2. Which of these is a right angle? ___



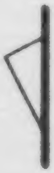




3. Drawing a mirror image of a figure around a line of symmetry by reflecting the vertices and connecting them with straight lines.

d

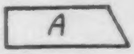
3. Draw a mirror image of the figure on the right hand side of the line, so that it is symmetrical.

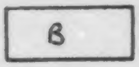


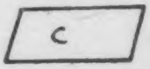
4. Distinguishing a rectangle from other quadrilaterals.

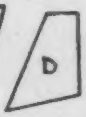
f

4. Which of these is a rectangle? ___







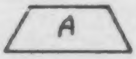


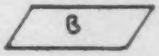
⑤. Identifying nine two-dimensional figures (circle, square, triangle, rectangle, parallelogram, trapezoid, pentagon, hexagon, octagon), given a list.

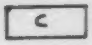
g

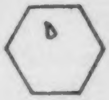
5. Write the letter for each shape by its name:

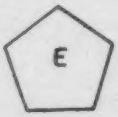
___circle
___square
___triangle
___trapezoid
___pentagon
___octagon
___rectangle
___hexagon
___parallelogram

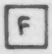


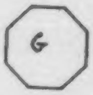


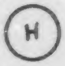


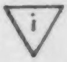




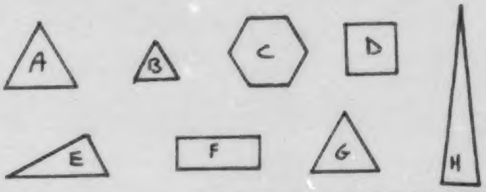
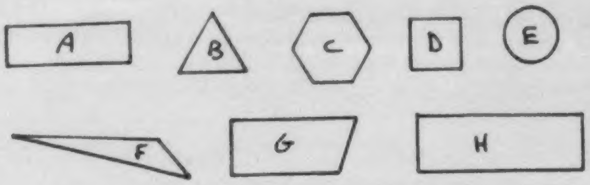
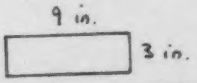
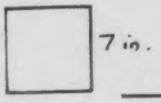
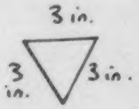
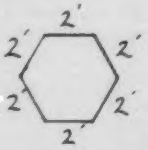
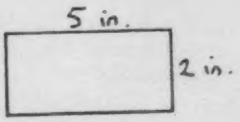
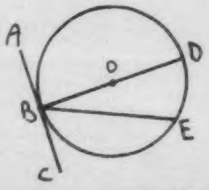




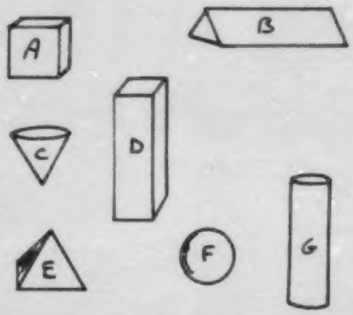
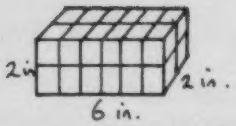




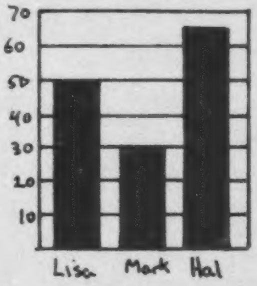
LEVEL FOUR F

⑥ Identifying where these shapes appear in the real world, given a list. g	6. Name two objects in this room that are rectangles: ____________
7. Identifying shapes that are congruent, using that term. h	7. Which two shapes are congruent? ___ and ___ 
8. Identifying shapes that are similar, using that term. h	8. Which two shapes are similar? ___ and ___ 
⑨ Finding the perimeter of a rectangle, given the two dimensions, and of a square, given one dimension (a definition of perimeter given). j	9. What is the perimeter (the distance around the outside) of each figure?  ______  ______
⑩ Finding the perimeter of other simple polygons, given all the dimensions. j	10. What is the perimeter (the distance around the outside) of each figure?  ______  ______
⑪ Finding the area of a rectangle or square, given the formula. k	11. What is the area of this rectangle? ___ square ins.  Area = length x width
12. Distinguishing a diameter from other lines in and around a circle, without using terms (maintained).	12. Which line goes through the center of the circle? ___ 

LEVEL FOUR F, G

⑬ Recognizing seven geometric solids (cube, rectangular solid, cylinder, cone, sphere, pyramid, and triangular prism), given drawings and a list. n	13. Write the letter for each shape by its name: ___pyramid ___sphere ___cone ___cube ___cylinder ___triangular prism ___rectangular solid 
14. Finding the volume of a rectangular solid, given dimensions under five units and grid markings on a drawing, and given the formula. p	14. What is the volume of this box (how many small cubes are in it)? ___cubic inches  Volume = length x width x height

G. ESTIMATING, GRAPHS, ETC.

① Rounding numbers off to the nearest ten, hundred, or thousand. a	1. Round off to the nearest ten: 65 ___ Round off to the nearest thousand: 4381 ____
② Estimating answers to word problems by rounding off. b	2. Juanita bought two records. They cost $6.95 each. About how much did they cost all together? $20 $18 $14 $10
3. Identifying simple probability. c	3. If you flip a coin 100 times, about how many times will it fall "heads?" ___
④ Using picture and bar graphs to answer questions and solve simple problems. e	4. This graph shows three children's bowling scores. Who had the highest score? _________ How much more did Lisa score than Mark? _____ Estimate Hal's score ____ 

91 objectives
64 circled

LEVEL FIVE

A. NUMBERS AND NUMERATION

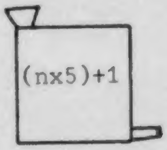
①. Writing numerals to the hundred millions place. a	1. Write seven hundred fifty-nine million two hundred twenty-one thousand in numerals: ________________
2. Using Roman numerals from one to one thousand. b	2. Write 324 in Roman numerals: __________ Write DCCLXXIV in Arabic numerals: _____
③. Identifying place value to the hundred millions place. c	3. 420,971,356 has: __ hundred thousands __ ones __ hundred millions __ thousands __ tens __ millions __ ten thousands __ hundreds __ ten millions
4. Arranging integers in order (under ten). i	4. Arrange these integers in order from the smallest to the largest value: 1 -5 3 -6 0 -9 __ __ __ __ __ __
5. Continuing number sequences in which each step doubles the previous one. k	5. What are the next two numbers in this sequence? 2, 4, 8, 16, ___, ___
6. Identifying numbers divisible by 2, 3, 4, 5, and 10. m	6. Which are divisible by 3? 35 48 99 Which are divisible by 10? 55 60 110 Which are divisible by 4? 24 49 112
7. Identifying prime and composite numbers between one and fifty. n	7. Write prime or composite by each number: 11 __________ 15 __________ 18 __________ 29 __________
8. Identifying the prime factors of numbers between one and fifty. o	8. Which is the set of prime factors for 28? 7 x 4 14 x 2 2 x 2 x 7 1 x 28

LEVEL FIVE B

B. COMPUTATION

① Adding columns of four 4-digit numbers or three 5-digit numbers. b	1. $\begin{array}{r}8937\\5092\\4450\\+2159\\\hline\end{array}$ $\begin{array}{r}77692\\35391\\+54921\\\hline\end{array}$
② Adding three numbers with different numbers of digits, written vertically or horizontally (if horizontal, students need to stack numbers up correctly). b	2. 492 + 99836 + 36 = ____ $\begin{array}{r}43923\\4450\\+\ \ 42\\\hline\end{array}$
③ Subtracting numbers with up to six digits, written vertically or horizontally (if horizontal, students need to stack numbers up correctly). c	3. 90000 - 2953 = _____ $\begin{array}{r}35012\\-\ 384\\\hline\end{array}$
④ Multiplying 4-digit multiplicands by 1-digit multipliers and 3-digit multiplicands by 2-digit multipliers, written vertically or horizontally. d	4. 4802 x 6 = ____ $\begin{array}{r}308\\\times\ 43\\\hline\end{array}$
⑤ Dividing 4-digit numbers with a zero by 1-digit divisors with remainders. e	5. $6\overline{)601}$
⑥ Dividing 3-digit numbers by 2-digit numbers with remainders. e	6. $67\overline{)537}$
⑦ Checking for errors in computation at this level. f	7. Circle any error or errors: $\begin{array}{r}88329\\48201\\+41998\\\hline 167528\end{array}$ $\begin{array}{r}70000\\-4391\\\hline 65609\end{array}$ $\begin{array}{r}540\\\times 42\\\hline 1080\\2160\ \\\hline 22680\end{array}$ $\begin{array}{r}1184 \text{ r.5}\\6\overline{)7109}\end{array}$
8. Identifying twelve mathematical terms, given a list of the terms. g	8. Match the name of each part of these computations with the numbers: $\begin{array}{r}2\\+3\\\hline 5\end{array}$ $\begin{array}{r}19\\-6\\\hline 13\end{array}$ $\begin{array}{r}15\\\times\ 4\\\hline 60\end{array}$ $\begin{array}{r}12\text{r.1}\\19\overline{)109}\end{array}$ remainder__ sum__ divisor__ addends ____ difference__ multiplier__ quotient__ multiplicand__ dividend__ minuend__ product__

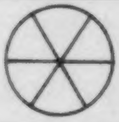
LEVEL FIVE B, C

⑨ Finding the average of a set of 2-digit numbers (no remainders). h	9. What is the average of 15, 12, 23, 10, and 25? ___
10. Identifying how much greater one multiple of ten or one hundred is than another judging by the addition of one or two zeroes. i	10. 2500 is how many times as great as 25? ___
11. Working out multiplication and division in parenthesis before adding or subtracting (order of operations). (maintained) j	11. 23 - (42 ÷ 6) = ___
12. Writing the open number sentence for word problems involving basic operations with one step. n	12. Write the number sentence for this problem: The difference between seven and what number is two. ___
13. Using empty boxes or letters as place holders in open number sentences. o	13. 5 x ☐ = 45 27 ÷ n = 3 n=___
14. Solving function problems, given a drawing and a two-step rule and less explicit explanation than level four. q	14. What will be the output of this function machine if each of these numbers is put in? INPUT — OUTPUT 3 — ___ 5 — ___ 12 — ___ 
⑮ Finding the missing information needed to solve a word problem that has insufficient information. $\boxed{r}$	15. Eighteen of the children in a class are girls. How many of the children in the class are boys? What else do you need to know to find the answer to this problem? ___
⑯ Solving one and two-step word problems involving computation at this level, some containing extraneous information. s	16. One package of fruit punch mix makes 2 quarts. It is 98° in the shade. How many quarts can be made from 6 packages? ___

C. FRACTIONS

① Circling one half, one third, one fourth, one fifth, or one eighth of a row of objects. a	1. Circle $\frac{1}{4}$ of this group: ● ● ● ● ● ● ● ● ● ● ● ● ●

LEVEL FIVE C

2. Shading in a fractional part of a whole unit. a	2. Shade in $\frac{5}{6}$ of this circle: 
3. Arranging fractions with denominators under ten in ascending or descending order (using lowest common denominator). b	3. Arrange these fractions in order from smallest to largest: $\frac{2}{3}$ $\frac{4}{9}$ $\frac{1}{2}$ $\frac{1}{4}$ __ __ __ __
4. Finding the fraction which when added to a given fraction makes one whole. c	4. $\frac{2}{3} + \_\_ = 1$ $\frac{1}{8} + \_\_ = 1$
5. Adding and subtracting common fractions with unlike denominators, answers in simplest terms, written vertically. d	5. $\begin{array}{r} \frac{1}{5} \\ + \frac{3}{4} \\ \hline \end{array}$ $\begin{array}{r} \frac{3}{4} \\ - \frac{1}{8} \\ \hline \end{array}$
6. Identifying fractions equivalent to one half, one third, one fourth, or one fifth. e	6. Which of these fractions is equal to $\frac{1}{3}$? $\frac{3}{8}$ $\frac{4}{4}$ $\frac{5}{6}$ $\frac{3}{9}$ $\frac{7}{7}$
7. Simplifying common fractions with denominators less than fifty. e	7. Simplify these fractions: $\frac{8}{10} = \_\_$ $\frac{12}{16} = \_\_$
8. Adding and subtracting mixed numbers with like denominators, no regrouping, answers in simplest terms. f	8. $\begin{array}{r} 4\frac{1}{4} \\ + 5\frac{1}{4} \\ \hline \end{array}$ $\begin{array}{r} 5\frac{3}{8} \\ -2\frac{1}{8} \\ \hline \end{array}$
9. Subtracting a common fraction from a one-digit whole number. g	9. $4 - \frac{1}{3} = \_\_\_\_$
10. Multiplying common fractions with cancellation, the word "of" substituted for the times sign in some problems, answers in simplest terms. h	10. $\frac{4}{9} \times \frac{3}{5} = \_\_$ $\frac{7}{8}$ of $\frac{4}{5}$
11. Multiplying a common fraction and a whole number, the word "of" substituted for the times sign in some problems, answers in simplest terms. h	11. $\frac{3}{5}$ of 15 = ___

LEVEL FIVE C, D

⑫ Multiplying a mixed number by a common fraction, answers in simplest terms. h	12. $\frac{3}{4} \times 2\frac{1}{2} =$ ____
⑬ Dividing common fractions, answers in simplest terms. i	13. $\frac{3}{8} \div \frac{3}{5} =$ ____
⑭ Dividing fractions by whole numbers and vice-versa, answers in simplest terms. i	14. $12 \div \frac{1}{3} =$ ____ $\frac{5}{8} \div 2 =$ ___
15. Finding the reciprocal of a common fraction. j	15. What is the reciprocal of $\frac{1}{8}$? —
16. Identifying numerator, denominator, mixed fractions, and improper fractions without benefit of a list. j	16. What is the top number in a fraction called? ____________ What is a fraction whose numerator is greater than or the same as its denominator called? ______________
⑰ Solving simple proportion problems in fraction and ratio form. k	17. $\frac{4}{12} = \frac{8}{\_}$ 3:9 = 5:__
⑱ Solving one and two-step word problems involving fractions at this level. l	18. Michael is following a recipe for making a cake. The recipe calls for 3/4 cup of sugar. If Michael wants to make three cakes, how much sugar will he need? _____

D. DECIMALS AND PERCENT

① Writing mixed decimals to the thousandths place written in words as numerals. b	1. Write twelve and twelve thousandths in numerals: _____
② Identifying decimal place value to the thousandths place. c	2. The number 25.187 has __ tenths, __ hundredths, and __ thousandths.
③ Using greater than (>) and less than (<) signs to compare decimals to the thousandths place. e	3. Put the correct sign between each pair of decimals: > = < 1.03 .103 ______ .204 .024 ______

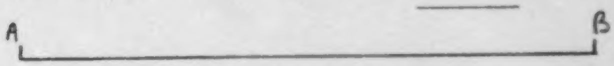
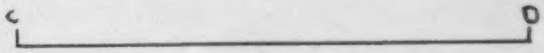
LEVEL FIVE D , E

4. Identifying equivalent decimals when some have redundant zeroes to the right of the last digit. f	4. Match the decimals that have the same value: .13 .01300 .013 .13000 .0013 .00130
5. Adding and subtracting decimals and mixed decimals to the thousandths place, with unequal numbers of decimal places, written vertically or horizontally. i	5. $\begin{array}{r}5.67\\4.6\\+12.546\\\hline\end{array}$ 5.462 - 1.5 = ____
6. Multiplying simple decimals and mixed decimals with 1-digit multipliers and two-digit multiplicands, written vertically. j	6. $\begin{array}{r}9.3\\\times\ .5\\\hline\end{array}$
7. Dividing decimals and mixed decimals of two digits by 1-digit divisors with no remainders, written vertically. k	7. $.3\overline{)4.8}$
8. Writing mixed fractions with tenths and hundredths as mixed decimals. l	8. Write as mixed decimals: $2\frac{1}{10}$ = ____ $5\frac{7}{100}$ = ____
9. Applying the complementarity of percents to 100%. n	9. 75% of a class is boys. What percent of the class is girls? ____ Roger got 95% right on a test. What percent did he get wrong? ____
10. Solving one and two-step word problems involving decimals and money at this level. r	10. A woman made $15 one day, $14.55 the next, and $45.60 the next. She spent half of her earnings on food. How much did she spend on food? ________ ________

E. MEASUREMENT

1. Calculating elapsed time given two points in time in digital or conventional readings. a	1. Breakfast was at quarter past eight. Lunch was at 12:50. How many hours and minutes were there between breakfast and lunch? __________

LEVEL FIVE E

② Adding and subtracting units of time with regrouping (seconds, minutes, hours, days, weeks, months, years, decades, and centuries).	b	2. 5 hours 30 minutes +3 hours 55 minutes 4 weeks 4 days -2 weeks 6 days
③ Telling the number of days in each month and the order of the months (maintained).	c	3. How many days are there in June? ___ How many days in October? ___ What is the eighth month? __________
④ Using a ruler to measure a line segment to a sixteenth of an inch.	d	4. Use your ruler to measure the line AB in inches. How long is it? ______ 
⑤ Using a metric ruler to measure a line segment to the nearest millimeter.	d	5. Use your metric ruler to measure the line CD. How long is it? _______ 
⑥ Adding and subtracting English linear measurements with regrouping.	e	6. 3 feet 11 inches +4 feet 5 inches 5 yards 1 foot -3 yards 2 feet
⑦ Adding and subtracting metric linear measurements with regrouping.	e	7. 14 meters 5 centimeters - 3 meters 11 centimeters
⑧ Adding and subtracting English units of capacity with regrouping.	f	8. 5 gallons 2 quarts +7 gallons 3 quarts
⑨ Memorizing basic equivalencies of metric capacity measurement (milliliters, liters) and using them to do one-step conversions.	f	9. How many millileters are there in 6 liters? _______
⑩ Adding and subtracting English units of weight with regrouping.	g	10. 7 pounds 3 ounces -2 pounds 8 ounces
⑪ Memorizing basic equivalencies of metric weight (grams, kilograms, and tonnes) and using them to do one-step conversions.	g	11. How many grams are there in 7 kilograms? ______

LEVEL FIVE E

⑫. Applying knowledge of the boiling and freezing points of water and of normal body temperature in degrees Fahrenheit to simple word problems.

h

12. Gloria's temperature is 103.7°. How far above normal is that? _____

The temperature outside is 23°. How far below freezing is that? _____

---

⑬. Memorizing the boiling and freezing points of water on the Celsius scale.

h

13. What is the boiling point of water in degrees Celsius? _____

What is the freezing point? _____

---

⑭. Identifying the appropriate measuring instrument for a task, given a list (maintained).

i

14. Write the measuring instrument that would be best for each job:

-measuring the school year ___________
-weighing a baby _________
-measuring flour for a cake _________

(clock, watch, stopwatch, ruler, measuring cup, scale, thermometer, calendar)

---

⑮. Identifying the appropriate unit of measurement, English or metric, from a list separated by English and metric.

j

15. Which unit of measurement would be best for each situation?

	ENGLISH	METRIC
-a man's height		
-water in a pool		
-the weight of a letter		

ounces	grams
pounds	kilograms
tons	tonnes
cups	milliliters
pints	liters
quarts	millimeters
gallons	centimeters
inches	meters
feet	kilometers
yards	degrees C.
miles	
degrees F.	

---

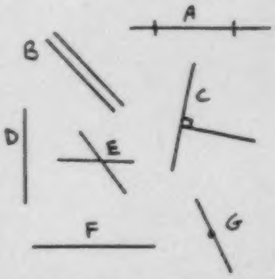
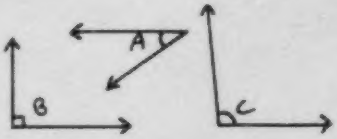
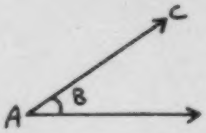
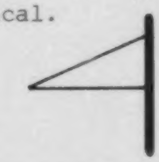
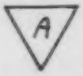
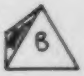
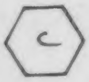
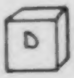
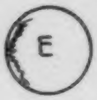
⑯. Estimating length, weight, capacity, and time.

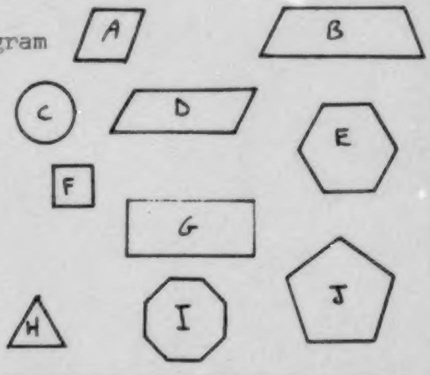
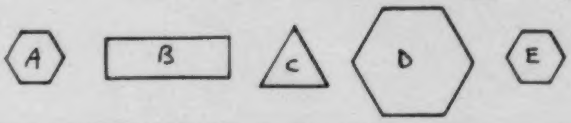
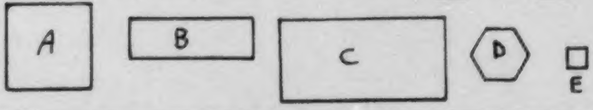
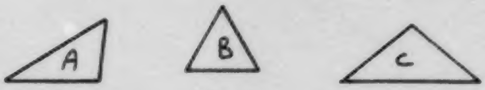
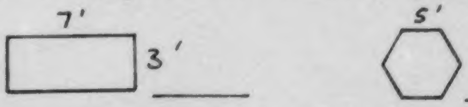
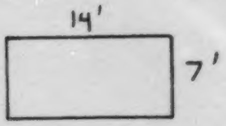
l

16. About how far is it from home to first base on a baseball diamond?

20 feet   30 feet   100 feet

F. GEOMETRY

1. Identifying terms dealing with lines given a map or isolated drawings (a list provided): line segment, point, vertical, horizontal, perpendicular, parallel, and intersecting. b	1. Write the letter for each figure by the name that describes it: ___line segment ___horizontal line ___vertical line ___parallel lines ___perpendicular line ___intersecting lines ___a point on a line 
2. Identifying right, acute, and obtuse angles, given drawings and a list. c	2. Write the letter for each kind of angle by its name: ___right angle ___acute angle ___obtuse angle 
3. Identifying the terms ray, vertex, and angle in a drawing. c	3. Write the letter for each term from the drawing: ___a ray ___the vertex ___the angle 
4. Drawing a mirror image of a figure around a line of symmetry by reflecting the vertices and connecting them with straight lines (maintained). d	4. Draw a mirror image of the figure on the right hand side of the line, so that it is symmetrical. 
5. Classifying shapes by whether they are two or three-dimensional. f	5. Which of these shapes are two-dimensional (flat)? _______ Which are three-dimensional? ______     

⑥ Identifying ten two-dimensional figures (circle, square, triangle, rectangle, parallelogram, rhombus, trapezoid, pentagon, hexagon, octagon) given a list. g	6. Write the letter for each shape by its name: ___parallelogram ___hexagon ___rhombus ___rectangle ___octagon ___circle ___square ___triangle ___trapezoid ___pentagon 
⑦ Identifying where these shapes appear in the real world, given a list. g	7. What shape is a door? a rhombus a square a rectangle a circle
8. Identifying shapes that are congruent (maintained). h	8. Which two shapes are congruent? __ and __ 
9. Identifying shapes that are similar (maintained). h	9. Which two shapes are similar? __ and __ 
10. Identifying an equilateral triangle. i	10. Which of these triangles is equilateral? 
⑪ Finding the perimeter of polygons. j	11. What is the perimeter of each figure:  ______ ______
⑫ Finding the area of a rectangle or square, given the formula, answers in square units. k	12. What is the area of this rectangle? Be sure to label the answer properly. Area = length x width  ______________

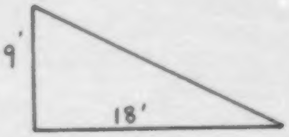
LEVEL FIVE F, G

⑬ Finding the area of a right triangle, given the formula, answers in square units.

k

13. What is the area of this triangle? Be sure to label the answer properly.

Area = ½(base x height)

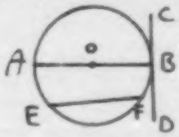


____

⑭ Identifying the diameter of a circle.

l

14. Which line is the diameter of the circle? ___

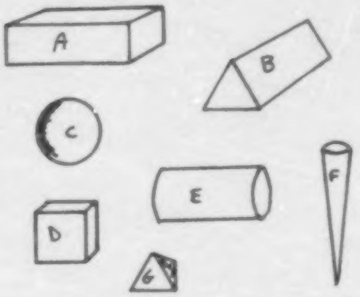


⑮ Identifying seven geometric solids (cube, rectangular solid, cylinder, cone, sphere, pyramid, and triangular prism), given drawings and a list (maintained).

n

15. Write the letter for each shape by its name:

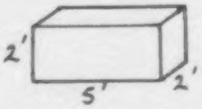
__cube
__sphere
__cylinder
__cone
__triangular prism
__rectangular solid
__pyramid



16. Finding the volume of a rectangular solid, given the formula, answers in cubic units.

p

16. What is the volume of this box? Be sure to label your answer correctly.



____

Volume = length x width x height

G. ESTIMATING, GRAPHS, ETC.

① Rounding whole numbers off to the nearest ten, hundred, thousand, or ten thousand.

a

1. Round off to the nearest hundred:

1649 _______

Round off to the nearest ten thousand:

142,612 _________

② Rounding off mixed decimals to the nearest whole number.

a

2. Round off to the nearest whole number:

5.299 _____

LEVEL FIVE G

3. Estimating answers to word problems by rounding off.

b

3. A woman made $195 one week, $203 the next, $186 the next, and $201 the next. About how much did she make in these four weeks?

$900 $800 $700 $600

4. Identifying simple probability.

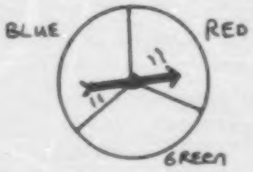
c

4. If you spin the needle on this spinner, what are the chances of the needle stopping on red?

-one in one

-one in two

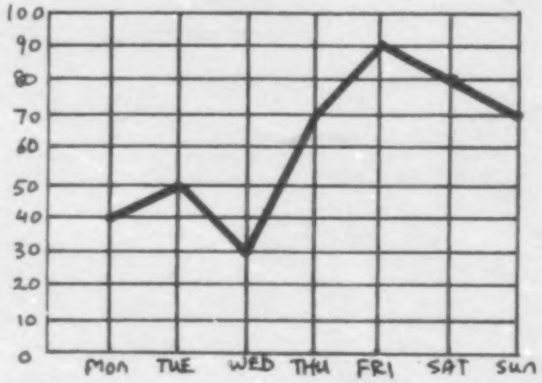
-one in three



5. Using picture, bar, and line graphs to answer questions and solve simple problems.

e

5. This graph shows the temperatures each day of a week.



What was the temperature on Thursday? ___

What two days had the same temperature?

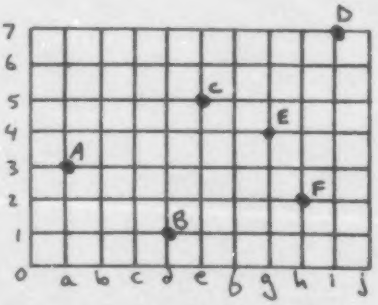
___

How much did the temperature drop from Tuesday to Wednesday? ___

6. Locating coordinates on a line graph.

f

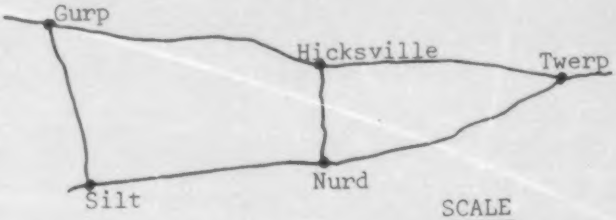
6. Which letter has the coordinates g,4 ___



LEVEL FIVE G

⑦ Getting distance information from a map by using the scale.

7. Use your ruler and the scale to estimate the distance from Gurp to Twerp: ________


Gurp
Hicksville
Twerp
Nurd
Silt

SCALE

1 in. = 20 mi.

i

102 objectives
69 circled

LEVEL SIX

A. NUMBERS AND NUMERATION

① Writing numerals to the billions place.	a	1. Write five billion, six hundred forty-two million, seven hundred thousand in numerals: ____
2. Using Roman numerals to two thousand.	b	2. Write 1982 in Roman numerals: ____ Write MDCCCXLVII in Arabic numerals: ____
③ Identifying place value to the billions place.	c	3. In the number 5,672,031,997: How many ten thousands? __ How many billions? __ How many tens? __ How many hundred millions? __
4. Writing numbers up to billions in expanded notation.	d	4. Write 4,658,332,091 in expanded notation: ____
⑤ Arranging integers in order (under twenty).	i	5. Arrange these integers in order from the smallest to the largest value: 14 -3 -7 2 0 -18 __ __ __ __ __ __
6. Identifying opposite integers.	j	6. Circle the two opposite integers: 16 -3 46 8 -5 3 -21
7. Continuing a number sequence that rises in arithmetic or geometric steps.	k	7. Write the next number in each sequence: 0, 4, 8, 12, ___ 2, 4, 16, ____
⑧ Identifying numbers divisible by 2, 3, 4, 5, 9, and 10, and odd and even numbers.	m	8. Which are divisible by 9? 46 72 135 Which are odd? 4 56 301 705 328
9. Identifying prime numbers between one and one hundred.	n	9. Circle the prime numbers: 28 51 83 91 97 99
10. Writing numbers up to one hundred in prime factored form.	o	10. What are the prime factors of 28? ____

LEVEL SIX A, B

⑪ Writing exponents in words and vice-versa.

P

11. Write in words: 4^2 - ______________

8^3 - ______________

Write in numeral form:

six squared _____

four to the fifth ____

B. COMPUTATION

① Adding numbers with up to six digits, written vertically or horizontally (if horizontal, students need to stack numbers up correctly).

b

1. 176,493 + 998,022 + 1,324 = ____

② Subtracting numbers with up to seven digits, written vertically or horizontally (if horizontal, students need to stack numbers up correctly).

c

2. 8,445,000 - 4,590 = ______

③ Multiplying 4-digit numbers by 3-digit numbers, written vertically or horizontally.

d

3. 4,085 x 231 = ________

④ Dividing 4-digit numbers by 2-digit numbers, with or without remainders, written vertically or horizontally.

e

4. 2807 ÷ 43 = _____

⑤ Checking for errors in computation at this level.

f

5. Circle any error or errors:

$$\begin{array}{r} 781\\ +390\\ \hline 1171 \end{array} \qquad \begin{array}{r} 875,400,980\\ -\ 2,334,199\\ \hline 873,066,781 \end{array} \qquad \begin{array}{r} 5401\\ \times\ 47\\ \hline 37807\\ 21604\\ \hline 253847 \end{array} \qquad \begin{array}{r} 66\text{r.}1\\ 67\overline{)4432} \end{array}$$

6. Identifying twelve mathematical terms, given a list of the terms (maintained).

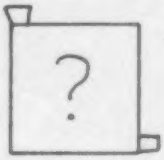
g

6. Which number is an example of each term?

product ___
addend ___
difference ___
quotient ___
sum ___
subtrahend___
minuend ___
divisor ___
remainder ___
multiplier ___
dividend ___
multiplicand ___

$$\begin{array}{r} 45\\ \text{x}4\\ \hline 180 \end{array} \qquad \begin{array}{r} 6\\ +6\\ \hline 12 \end{array} \qquad \begin{array}{r} 2\text{r.}1\\ 58\overline{)117} \end{array} \qquad \begin{array}{r} 76\\ -16\\ \hline 80 \end{array}$$

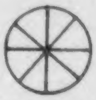
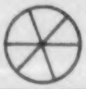
LEVEL SIX B

<table>
<tr><td>⑦ Finding the average of a set of 2-digit numbers, no remainders, presented in a word problem.
h</td><td>7. A salesman drives 55 miles one week, 31 miles the next, and 97 miles the next. What is the average distance he drives a week? ________</td></tr>
<tr><td>8. Identifying how many times greater one multiple of ten, one hundred, or one thousand is than another, judging by the addition of one, two, or three zeroes.
i</td><td>8. 20,000 is how many times as great as 20? ___</td></tr>
<tr><td>9. Working out multiplication and division in parenthesis before adding or subtracting (maintained).
j</td><td>9. $35 - (45 \div 5) + (4 \times 16) =$ ___</td></tr>
<tr><td>⑩ Solving computations with two exponents to the power of two, three, or four.
k</td><td>10. $4^2 + 3^3 =$ ___</td></tr>
<tr><td>11. Adding and subtracting 1-digit integers.
m</td><td>11. ${}^+5 + {}^-6 =$ ___</td></tr>
<tr><td>12. Writing open number sentences for word sentences involving one operation.
n</td><td>12. Write a number sentence for this statement: Three more than what number is nineteen. ________</td></tr>
<tr><td>13. Using letters as place holders in simple open number sentences.
o</td><td>13. $36 \div x = 12$ $x =$ __</td></tr>
<tr><td>14. Evaluating a simple expression with one variable, given the value of the variable.
p</td><td>14. $12 + b =$ ___ (b=4)</td></tr>
<tr><td>15. Deducing the one-step rule of a function machine, given input and output information.
q</td><td>15. Look at the input and output of this function machine and figure out what its rule is. ______
<table><tr><th>INPUT</th><th>OUTPUT</th></tr><tr><td>5</td><td>12</td></tr><tr><td>7</td><td>14</td></tr><tr><td>10</td><td>17</td></tr><tr><td>14</td><td>21</td></tr></table> </td></tr>
<tr><td>⑯ Finding the missing information needed to solve a word problem that has insufficient information.
7
r</td><td>16. A plane is flying at 576 miles per hour. How long will it take to reach its destination?
What else do you need to know to solve this problem? ____________</td></tr>
</table>

LEVEL SIX B, C

17. Solving one and two-step word problems involving computation at this level, some including extraneous information. s	17. David collected 35 baseball cards. Elena collected 70. Each card is worth \$5.00. How much are Elena's cards worth? ____

C. FRACTIONS

1. Filling in one half, one third, or one fourth of a figure divided into units that are a multiple of the fraction. a	1. Fill in one half of this circle:  Fill in one third of this circle: 
2. Circling one half, one third, two thirds, one fourth, three fourths, or one eighth of a row of objects. a	2. Circle $\frac{3}{4}$ of this group: ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
3. Arranging fractions with denominators of twelve and under in order of size. b	3. Arrange these fractions in order from smallest to largest: $\frac{1}{5}$ $\frac{1}{2}$ $\frac{3}{8}$ $\frac{4}{9}$ $\frac{1}{3}$ __ __ __ __ __
4. Finding the fraction which when added to a given fraction makes one whole (maintained). c	4. $\frac{7}{11} + \_\_ = 1$ $\frac{5}{16} + \_\_ = 1$
5. Adding and subtracting common fractions with unlike denominators, answers in simplest terms, written horizontally. d	5. $\frac{4}{5} + \frac{3}{8} = \_\_$ $\frac{2}{3} - \frac{1}{9} = \_\_$
6. Finding a fractional part of a large number, expressed in lowest terms, in word problem form. e	6. 350 out of 420 people voted for a candidate in an election. What fraction is this, in simplest terms? __
7. Adding mixed numbers with like denominators with regrouping, written vertically, answers in simplest terms. f	7. $\begin{array}{r} 4\frac{2}{3} \\ +2\frac{2}{3} \\ \hline \end{array}$
8. Subtracting mixed numbers with like denominators with regrouping, written vertically, answers in simplest terms. f	8. $\begin{array}{r} 6\frac{1}{7} \\ -3\frac{3}{7} \\ \hline \end{array}$

LEVEL SIX C , D

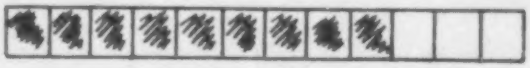
⑨ Adding and subtracting mixed numbers with unlike denominators, no regrouping, written vertically, answers in simplest terms. g	9. $\begin{array}{r} 4\frac{1}{3} \\ +9\frac{2}{5} \\ \hline \end{array}$ $\begin{array}{r} 6\frac{1}{6} \\ -4\frac{1}{9} \\ \hline \end{array}$
⑩ Multiplying two or three common fractions, mixed fractions, or whole numbers, including finding a fraction of money, simplified answers. h	10. $\frac{1}{3} \times 2\frac{3}{4} \times 4 =$ ____ $\frac{2}{3}$ of \$51 = ____
⑪ Dividing common fractions, mixed fractions, or whole numbers, answers in simplest terms. i	11. $1\frac{1}{5} \div \frac{1}{2} =$ ____ $\frac{4}{5} \div 8 =$ ____
12. Identifying numerator, denominator, reciprocal, mixed fraction, and improper fraction without benefit of a list. j	12. What is the bottom number in a fraction called? ________ What is a whole number and a common fraction called? ________ What is the reciprocal of 5/6? ___
⑬ Solving ratio and proportion problems in practical situations. k	13. One can of concentrated orange juice needs three cans of water. Four cans of concentrate need ___ cans of water.
14. Solving ratio and proportion problems in fraction and ratio form. k	14. 3:12 = 6:__ $\frac{2}{5} = \frac{6}{n}$ n=__
⑮ Solving one and two-step word problems involving fractions at this level. l	15. There were 30 problems on a test. Rachel got 5/6 of them right. How many problems did she get wrong? __

D. DECIMALS AND PERCENT

① Writing mixed decimals to the ten thousandths place written as words as numerals. b	1. Write five and twenty-eight ten thousandths in numerals: ________
② Identifying decimal place value to the ten thousandths place. c	2. The number 3.4902 has: ___ hundredths ___ tenths ___ ten thousandths ___ thousandths

LEVEL SIX D

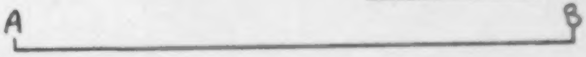
③ Arranging decimals in order of size.	e	3. Arrange these decimals in order from the smallest to the largest. .5 .55 .05 .005 .0555 ___ ___ ___ ___ ___
4. Identifying equivalent decimals when some have redundant zeroes to the right of the last digit (maintained).	f	4. Which has the same value as .34 ? ______ .034 .0034 .3400 .00034
⑤ Writing a number containing millions and hundred thousands in abbreviated decimal notation, given an example from a newspaper story.	g	5. A newspaper story says that a town's budget is \$3.4m. Write this out in standard form. ______________
⑥ Adding and subtracting decimals and mixed decimals with different numbers of decimal places, written horizontally (students need to stack numbers up correctly).	i	6. 55.1 + 3.119 + 600 = ____ \$22 - \$1.99 = _______
⑦ Multiplying decimals, mixed decimals, and whole numbers with up to 2-digit multipliers, written horizontally or vertically.	j	7. 4.8 x .35 = _____ $\begin{array}{r}2.15\\ \text{x}\ \ 69\\ \hline\end{array}$
⑧ Dividing decimals, mixed decimals, and whole numbers with 1-digit divisors, written horizontally, without remainders.	k	8. 1.56 ÷ .3 = ____
⑨ Writing fractions and mixed numbers with denominators of ten, one hundred, one thousand, and ten thousand as decimals and mixed decimals.	l	9. Write as decimals and mixed decimals: $\frac{1}{10000}$ = ____ $2\ \frac{7}{100}$ = _____
⑩ Changing common fractions with terminating decimals to decimals.	l	10. Write the equivalent decimal: $\frac{1}{4}$ = ____ $\frac{3}{8}$ = ____
11. Identifying simple fractions that have repeating or recurring decimals when converted to decimals.	l	11. Which of these has a recurring decimal when converted to a decimal? $\frac{1}{2}$ $\frac{3}{8}$ $\frac{2}{3}$ $\frac{7}{8}$ $\frac{1}{4}$

⑫ Changing decimals to the hundredths place to percents. m	12. Change to percents: .34 = ___% .03 = ___%
13. Changing a whole-number percent of two digits to its decimal equivalent. m	13. Change to decimals: 82% = ____ 5% = ____
⑭ Changing common fractions to percents (only terminating decimals). n	14. Change to percents: $\frac{1}{2}$ = ___% $\frac{5}{8}$ = ___%
15. Changing the percents for common fractions to fractions. n	15. Write the fraction for each percent: 30% = — 25% = — 12½% = — 66$\frac{2}{3}$% = —
16. Telling what percent of a figure is shaded, given a common fraction shaded. n	16. What percent of this figure is shaded in? ____ 
⑰ Finding the percent of a whole number (only whole number percents). o	17. What is 35% of 350? _____
⑱ Solving one and two-step word problems involving decimals and percents at this level. r	18. A meal in a restaurant costs $18.24. What would a 15% tip on this bill be? (Round to the nearest cent) _______

E. MEASUREMENT

① Calculating the elapsed time given two points in time in digital or conventional readings (maintained). a	1. School begins at 8:45 and lets out at ten minutes past three. How many hours and minutes is school in session? _______________

LEVEL SIX E

② Renaming "improper" measures of time (e.g. 25 hours) with two measures. b	2. 27 hours = ___ day(s) ___ hour(s) 125 minutes = ___ hour(s) ___ minute(s) 35 years = ___ decade(s) ___ year(s)
③ Telling the number of days in each month (maintained). c	3. How many days are there in March? ___ How many days in September? ___ How many in a leap-year February? ___
④ Interpreting and writing dates in numerical form. c	4. What month, day, and year does 5/13/82 mean? ____________________ Write November 8th, 1982 in numerical form: ___/___/___
⑤ Using an English and metric ruler to measure a line segment. d	5. How long is the line AB in metric measurement? __________ How long is it in English measurement? __________ 
⑥ Renaming "improper" English and metric linear measures with two measures. e	6. 25 inches = ___ feet ___ inch(es) 10,000 feet = ___ mile(s) ___ feet 350 centimeters = ___ meter(s) ___ centimeters
⑦ Renaming "improper" English and metric capacity measures with two measures. f	7. 9 quarts = ___ gallon(s) ___ quart(s) 3 cups = ___ pint(s) ___ cup(s) 2007 millileters = ___ liter(s) ___ milliliters
⑧ Renaming "improper" English and metric weight measures with two measures. g	8. 35 ounces = ___ pound(s) ___ ounce(s) 3315 grams = ___ kilogram(s) ___ gram(s)
⑨ Applying knowledge of the boiling and freezing points of water and of normal body temperature in degrees Fahrenheit to do simple word problems (maintained). h	9. After he ran the Boston marathon, a man was recorded as having a temperature of 92.3°. How far below normal was this? ______________

LEVEL SIX E

⑩ Knowing an approximate Celsius temperature reading for a hot day, a mild day, and a cold day, and the exact reading for the boiling and freezing point of water. The following verse is helpful:

Thirty is steamy
Twenty is nice
Ten is chilly
And zero is ice

h

10. Write the approximate Celsius temperature (a ~~multiple~~ of ten) for each of these:

-boiling water ___
-a very hot day ___
-a pleasant day ___
-a cold day ___
-freezing water ___

⑪ Identifying the appropriate measuring instrument for a task, given a list (maintained).

i

11. What measuring instrument would be best for each job?

-measuring a board ___________
-weighing a letter ___________
-counting minutes till lunch _________

(clock, stopwatch, ruler, tape measure, measuring cup, scale, thermometer, calendar)

⑫ Identifying the appropriate unit of measurement, English or metric, from a list separated by English and metric (maintained).

j

12. Which unit of measurement would be best for each situation?

	ENGLISH	METRIC
-a boulder's weight		
-sugar for a cake		
-the thickness of a half dollar		

ounces
pounds
tons
cups
pints
quarts
gallons
inches
feet
yards
miles
degrees F.

grams
kilograms
tonnes
milliliters
liters
millimeters
centimeters
meters
kilometers
degrees C.

⑬ Estimating length, weight, capacity, and time.

l

13. About how much do you think a full-grown elephant weighs?

100 pounds 300 pounds 2 tons

LEVEL SIX F

F. GEOMETRY

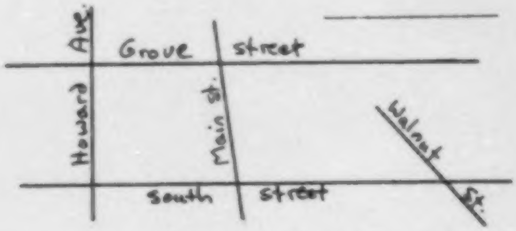
①. Identifying terms dealing with lines given a map or isolated drawings (a list provided): line segment, point, vertical, horizontal, perpendicular, parallel, and intersecting (maintained)

b

1. Which street intersects with Walnut St? ________

Which street runs perpendicular to South Street? ________

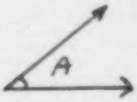
Which street is parallel to South Street? ________

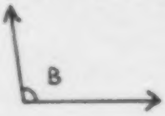


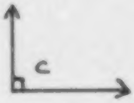
2. Identifying right, acute, and obtuse angles, given drawings and a list (maintained).

c

2. Which is a right angle? ___ An acute angle? ___ An obtuse angle? ___







3. Identifying the terms ray, vertex, and angle in a drawing (maintained).

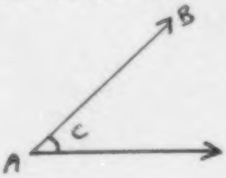
c

3. Write the letter for each term:

__a ray

__the vertex

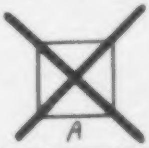
__the angle

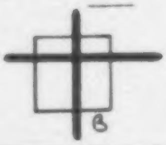


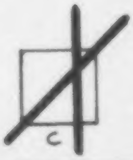
4. Identifying a figure with two lines of symmetry drawn through it.

d

4. Which square has two lines of symmetry drawn through it? ___



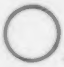


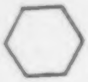


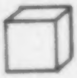
5. Classifying shapes by whether they are one, two, or three-dimensional.

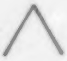
f

5. Write by each figure whether it is one, two, or three dimensional:

 ____

 ____

 ____

 ____

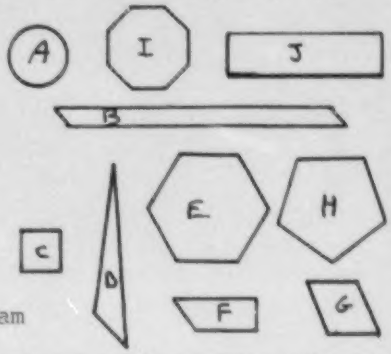
LEVEL SIX F

⑥ Identifying ten two-dimensional figures (circle, square, triangle, rectangle, parallelogram, rhombus, trapezoid, pentagon, hexagon, octagon, given a list (maintained).

g

6. Write the letter for each shape by its name:

__pentagon
__trapezoid
__triangle
__square
__octagon
__circle
__rectangle
__rhombus
__hexagon
__parallelogram



⑦ Identifying where these shapes appear in the real world (maintained).

g

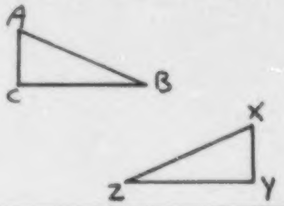
7. What shape is a stop sign?

- octagon
- hexagon
- parallelogram

8. Identifying equal sides and angles in congruent figures.

h

8. If these two triangles are congruent, which angles and sides are equal?

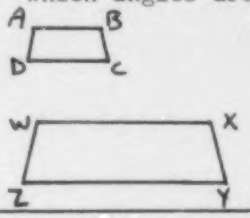


Δ ABC	Δ XYZ
∠ABC	
∠ACB	
$\overline{AB}$	
$\overline{AC}$	

9. Identifying corresponding sides and equal angles in similar triangles.

h

9. If these two trapezoids are similar, which angles are equal?



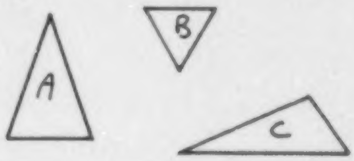
ABCD	WXYZ
∠ABC	
∠ADC	
∠BCD	

10. Identifying isosceles, equilateral, and scalene triangles.

i

10. Write the letter of each kind of triangle by its name:

__equilateral
__isosceles
__scalene



⑪ Finding the perimeter of a square, rectangle, or triangle in a word problem.

j

11. A man wants to put a fence around a rectangular garden 15 feet long and 12 feet wide. How many feet of fence does he need? ____________

LEVEL SIX F

⑫ Finding the area of a rectangle or a square in a word problem, given the formula, answers in square units.

k

12. A woman wants to buy carpet to cover the floor of a room 12 feet long and 8 feet wide. How many square feet of carpet will she need?

____

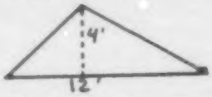
(Area = length x width)

---

⑬ Finding the area of any triangle or a parallelogram, given the formula, answers in square units.

k

13. What is the area of this triangle?



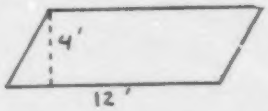
____

(Area = ½(base x height)

What is the area of this parallelogram?

____

(Area = base x height)



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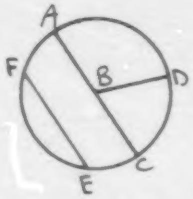
⑭ Identifying center, diameter, radius, chord, and circumference of a circle.

l

14. Write the letters for each part of this circle:

___diameter
___radius
___center
___chord
___circumference



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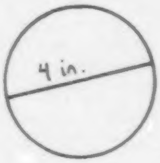
15. Finding the circumference of a circle, given the formula and the value of π.

m

15. What is the circumference of this circle?

____



(Circumference = π x diameter)
π = 3.14

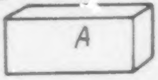
---

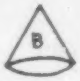
⑯ Identifying seven geometric solids (cube, rectangular solid, cylinder, cone, sphere, pyramid, and triangular prism), and everyday objects that have that shape, given a list.

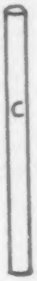
n

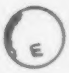
16. Write the letter for each shape by its name or corresponding shape.

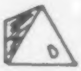
__pyramid
__sphere
__cube
__cone
__cylinder
__triangular prism
__brick

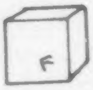


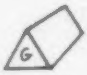












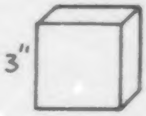
LEVEL SIX F, G

17. Finding the surface area of a cube or rectangular solid, formula given.

o

17. What is the surface area of this cube?

(Surface area = $6 \times E^2$, where E is the length of each side) ____________

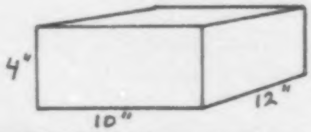


⑱ Finding the volume of a rectangular solid or cube, given the formula, answers in cubic units (maintained).

p

18. What is the volume of this box? ____________

(Volume = length x width x height)



G. ESTIMATING, GRAPHS, ETC.

① Rounding whole numbers off to any place up to hundred thousands.

a

1. Round off to the nearest thousand:

34,620 __________

Round off to the nearest hundred thousand:

255,029 __________

② Rounding off decimals and mixed decimals to the nearest whole number, tenth, or hundredth, and money to the nearest cent.

a

2. Round off to the nearest tenth:

.862231 ___

Round off to the nearest cent:

$14.29332 _____

③ Estimating answers to word problems by rounding off, including area and volume problems.

b

3. A man made $19,638.51 one year. About how much would he make in three years at this salary?

$40,000 $50,000 $60,000 $80,000

④ Identifying probability in word problems.

c

4. Julie has a bag with 3 blue marbles and 2 green marbles. If she reaches into the bag without looking, what are her chances of pulling out a blue marble?

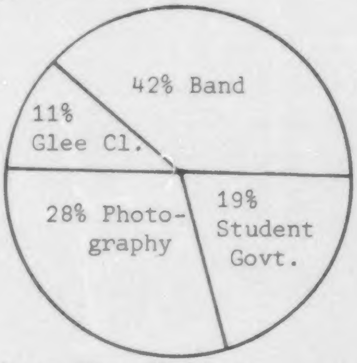
2 out of 3 2 out of 5 3 out of 5

LEVEL SIX G

⑤ Using picture, bar, line, and circle graphs to answer questions and solve problems.

e

5. This graph shows the percent of students taking different electives.



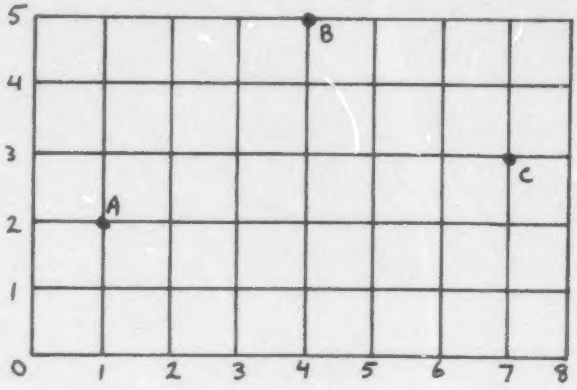
What percent chose Glee Club? ___

How much greater was the percent taking Band than Photography? ____

6. Graphing ordered pairs.

f

6. Write the coordinates for each point on the grid: A ____ B ____ C ____



⑦ Identifying the median of a set of data.

g

7. What is the median of this set of test scores?

100% 85% 85% 93% 42% 66% 48%

⑧ Getting information from a table or schedule.

h

8. Which city reached its peak in 1970? _____

Which city lost the most people from its peak? ____________

Population of Several U.S. Cities 1920 - 1970

	1920	1940	1960	1970
Boston	748,060	770,816	697,197	641,071
Detroit	993,678	1,623,144	1,670,144	1,513,601
Houston	138,276	384,514	938,219	1,232,802
San Francisco	506,676	634,536	740,316	715,674

LEVEL SIX G

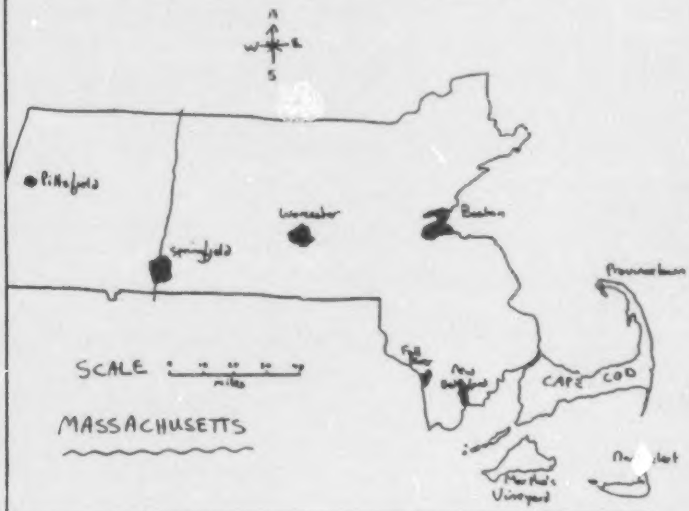
⑨ Getting distance information from a map by using the scale.

9. Use this map and the scale to estimate the distance by air from:

Boston to Provincetown ______

Boston to Pittsfield _____

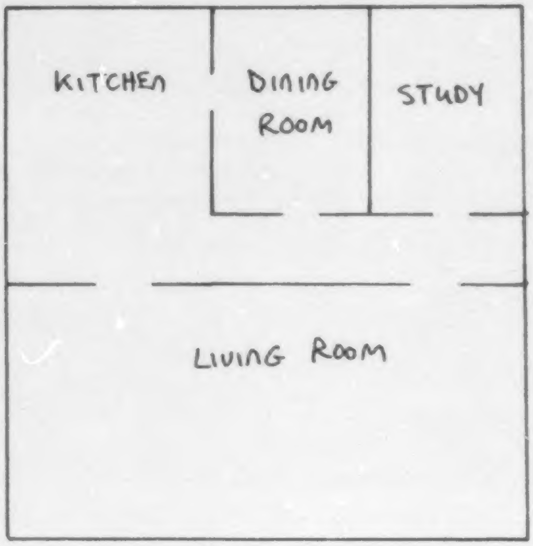
Springfield to Nantucket _____


N
W
E
S
Pittsfield
Worcester
Boston
Springfield
Provincetown
Fall River
New Bedford
CAPE COD
Martha's Vineyard
Nantucket
SCALE
0
10
20
30
40
miles
MASSACHUSETTS

⑩ Getting information from a scale drawing.

10. Use your ruler to find the dimensions of the living room in this scale drawing.

______ long, ____ wide


KITCHEN
DINING ROOM
STUDY
LIVING ROOM

SCALE: 1 in. = 10 ft.

108 objectives
70 circled

LEVEL SEVEN

A. NUMBERS AND NUMERATION

① Writing numerals to the hundred trillions place.	a	1. Write fifty-nine trillion, four hundred billion, seventy-three thousand in numerals: ____________
2. Using Roman numerals to two thousand (maintained).	b	2. Write 1496 in Roman numerals: ______ Write MCMDCCCXLIV in Arabic numerals: ____
③ Identifying place value to the trillions place.	c	3. In the number 6,538,204,191,000: How many trillions? __ How many ten thousands? __ How many billions? __
4. Identifying a ten-digit number from its expanded exponential notation.	d	4. Write in standard form: $(9 \times 10^4) + (7 \times 10^3) + (5 \times 10^2) +$ $(7 \times 10) + (6 \times 1)$ ____________
⑤ Arranging any integers in order.	i	5. Arrange these integers in order from the smallest to the largest value: 46 -3 -27 552 0 34 -34 ___ ___ ___ ___ ___ ___ ___
6. Identifying opposite integers.	j	6. Circle the two opposite integers: 45 -24 98 -54 24 51 -100
7. Continuing a number sequence that rises in arithmetic or geometric steps (maintained).	k	7. What are the next two numbers in this sequence? 2, 4, 8, 16, ___, ___
⑧ Identifying numbers divisible by 2, 3, 4, 5, 9, and 10, and odd and even numbers (maintained).	m	8. Which are divisible by 4? 34 51 92 12 Which are even numbers? 4 290 391 100
9. Identifying prime numbers up to one hundred (maintained).	n	9. Write the prime numbers between 70 and 80: ________
10. Expressing a number up to one hundred as a product of prime factors, using exponential notation when necessary.	o	10. Write the prime factors of 80 using exponential notation: ________

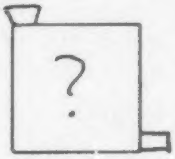
LEVEL SEVEN A, B

⑪ Expressing exponents in words and vice-versa (maintained). p	11. Write in words: 12^5 __________ 6^3 __________ Write in numeral form: nine squared ____ two to the sixth ___
⑫ Writing products of ten as exponential powers of ten. p	12. Write as powers of 10: 10,000 = ___ 1,000,000 = ___
13. Finding the square root of perfect squares. q	13. What is the square root of 64? __ ...of 144? ___
14. Estimating the square root of a non-perfect-square number under one hundred, to the nearest tenth. q	14. What is the square root of 80, rounded to the nearest tenth? ____

B. COMPUTATION

① Adding numbers with up to seven digits, written vertically or horizontally (if horizontal, students need to stack numbers up correctly). b	1. 2,335,545 + 329,009 + 44,391 = __________
② Subtracting numbers with up to eight digits, written horizontally or vertically (if horizontal, students need to stack numbers up correctly). c	2. 54,000,000 - 3,452,993 = __________
③ Multiplying 5-digit by 3-digit numbers written vertically or horizontally. d	3. 41,398 x 981 = __________
④ Dividing 5-digit by 3-digit numbers, with remainders, written vertically or horizontally, quotients expressed as mixed numbers. e	4. 89,284 ÷ 132 = _______ (express the answer as a mixed number)
⑤ Checking for errors in computation at this level.	5. Circle any error or errors: $\begin{array}{r} 86694 \\ 29650 \\ \underline{+3298} \\ 102242 \end{array}$ $\begin{array}{r} 30000 \\ \underline{-2572} \\ 32572 \end{array}$ $\begin{array}{r} 8391 \\ \underline{x315} \\ 41955 \\ 8391 \\ \underline{25173} \\ 2643265 \end{array}$ $\begin{array}{r} 514\frac{15}{92} \\ 92\overline{)47293} \end{array}$

LEVEL SEVEN B

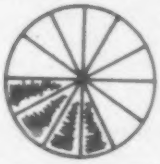
6. Using the twelve terms for different parts of computation problems without benefit of a list (addend, sum, minuend, subtrahend, difference, multiplicand, multiplier, product, divisor, dividend, quotient, remainder). g	6. What is the answer to a division problem called? _________ What is the top number in a subtraction problem called? ____________
7. Finding the average of whole numbers and decimals presented in word problem form, rounding remainders to the nearest unit. h	7. What is the average of these test scores: 88%, 47%, 93%, and 69% (round to the nearest whole percent). ___
8. Identifying how many times greater one multiple of ten, one hundred, or one thousand is than another, judging by the addition of one, two, or three zeroes (maintained). i	8. 5,600 is how many times as great as 56? __
9. Knowing the order of operations in expressions written without parentheses (multiplication and division before addition and subtraction). j	9. $5 + 3 \times 12 - 3 \times 6 =$ ____
10. Solving problems with two or three exponents up to the fifth power. k	10. $5^2 + 3^4 + 9^3 =$ ____
11. Adding and subtracting 1-digit integers (maintained). m	11. $^{-}6 + ^{-}4 =$ ____
12. Writing open number sentences for word sentences involving one operation (maintained). n	12. Write the number sentence for this statement: Seven times what number is eighty-four? ____________
13. Solving a simple equation with one variable and one operation. o	13. $a + 15 = 25$ $a =$ ___
14. Finding the value of an open phrase with two variables, given the value of the variables. p	14. $4a + 3b =$ ____ ($a=2$, $b=6$)
15. Deducing the two-step rule of a function machine, given input and output information. q	15. Look at the input and output of this function machine and figure out what its rule is. ________ 

INPUT	OUTPUT
1	5
2	8
3	11

LEVEL SEVEN B, C

⑯ Identifying the missing information needed to solve a word problem that has insufficient information.	r	16. A farmer's chickens produced 5,411 eggs one year and 3,492 eggs the next. How many eggs did each chicken produce for the two years? What additional information do you need to solve this problem? ___
⑰ Solving one, two, or three-step word problems involving computation at this level, some including extraneous information.	s	17. A factory turned out 350 cars each month. The average value of each car was \$6,334. At this rate, what would be the value of the cars produced by the factory in a year? ___

C. FRACTIONS

① Writing the common fraction reduced to the lowest terms that is shaded in.	a	1. What fraction of the circle is shaded in (state in the lowest terms)? ___ 
② Circling a fraction of a row of objects.	a	2. Circle $\frac{5}{8}$ of this group: ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
3. Arranging fractions in order of size.	b	3. Arrange these fractions in order from smallest to largest: $\frac{1}{2}$ $\frac{3}{4}$ $\frac{9}{10}$ $\frac{7}{8}$ $\frac{1}{3}$ $\frac{4}{15}$ __ __ __ __ __ __
4. Finding the fraction half way between two fractions.	b	4. What fraction is half way between $\frac{1}{8}$ and $\frac{4}{5}$? ___
5. Finding the fraction which when added to a given fraction makes one whole (maintained).	c	5. $\frac{7}{17} + \_\_ = 1$
⑥ Finding a fractional part of a large number, expressed in lowest terms, in word problem form (maintained).	e	6. A man earns \$27,000 a year. He spends \$18,000. What fraction is this, reduced to the simplest terms? ___

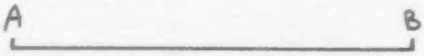
LEVEL SEVEN D

⑩ Writing fractions and mixed fractions with denominators of ten, one hundred, one thousand.. to one million as decimals and mixed decimals. l	10. Write as decimals and mixed decimals: $\frac{7}{1,000,000}$ = ______ $9\frac{3}{100,000}$ = ______
⑪ Changing any common fraction to a decimal (to a given number of decimal places). l	11. Write $\frac{7}{9}$ as a decimal, rounded to three decimal places: ______
⑫ Changing decimals to the thousandths place and mixed decimals to percents. m	12. Change to percents: 1.3 = ____% .333 = ____%
13. Changing percents with one decimal place and percents over one hundred to decimals and mixed decimals. m	13. Change to decimals: 155% = ______ .051% = ______
⑭ Changing common fractions with terminating and recurring decimals to percents. n	14. Change to percents, rounded to the tenths place: $\frac{1}{3}$ = ____% $\frac{5}{9}$ = ____%
⑮ Memorizing the percent equivalencies of frequently-used fractions (one half, one third, two thirds, one quarter, three quarters, all fifths, eighths, and tenths). n	15. What are the percent equivalencies of: $\frac{1}{4}$ = ____ $\frac{4}{5}$ = ____ $\frac{7}{10}$ = ____
⑯ Finding the percent of a whole number or mixed decimal when the percent is a mixed decimal or more than one hundred. o	16. What is $9\frac{1}{2}\%$ of 2500? ______ What is 150% of 490? ______
17. Finding what percent one number is of another (percents under one hundred), expressed in word problems. $\boxed{\text{p}}$	17. A boy got 15 out of 24 right on a math test. What percent was that? ____
18. Finding a number when the percent of it is known (percents under 100). $\boxed{\text{q}}$	18. 16 is 80% of what number? ____

LEVEL SEVEN D, E

⑲ Solving one and two-step word problems involving decimals and percents at this level, including problems with commissions, discounts, profit, interest, etc. r	19. A car cost $7,395 after being marked down from $8,700. What was the percent of the discount? ________ How much would a $55 dress cost if it was marked down 15% ? ______

E. MEASUREMENT

① Calculating elapsed time given two points in time in digital or conventional readings (maintained). a	1. A concert begins at 8:45. It is now ten minutes before six. How much time is there before the concert? ________
② Doing two-step conversions between units of time (seconds, minutes, hours, days, weeks, years, decades, centuries) b	2. How many seconds are there is two hours? _____ How many hours in two weeks? _____
③ Telling the number of days in each month (maintained). c	3. How many days are there in June? ___ How many days in a non-leap-year February? ___
④ Interpreting and writing dates in numerical form (maintained). c	4. What month, day, and year does 8/2/83 mean? ____________ Write February 14, 1983 in numerical form: ___/___/___
⑤ Using an English and metric ruler to measure a line segment (maintained). d	5. How long is the line AB in inches? ____ How long in metric measurement? _____ 
⑥ Doing two-step conversions within English linear measures and within metric linear measures (inches, feet, yards, miles; millimeters, centimeters, meters, kilometers). e	6. How many inches in two miles? ________ How many millimeters in a kilometer? ________
⑦ Doing two-step conversions within English capacity measures and within metric capacity measures (cups, pints, quarts, gallons; milliliters, liters, kiloliters). f	7. How many cups are there in 3 quarts? ___ How many milliliters in 6 kiloliters? ____

LEVEL SEVEN E

(8.) Doing two-step conversions within English measures of weight and within metric measures of weight (ounces, pounds, tons; grams, kilograms).

g

8. How many ounces are there in two tons? ______

How many grams in 15 kilograms? ______

(9.) Applying knowledge of the boiling and freezing points of water and of normal body temperature in degrees Fahrenheit to do simple word problems (maintained).

h

9. A woman ran a fever 5.8° above her normal body temperature. What was her temperature during the fever? ______

(10.) Knowing an approximate Celsius temperature reading for a hot day, a mild day, and a cold day, and the exact reading for the boiling and freezing point of water (maintained). The following verse is helpful:

Thirty is steamy
Twenty is nice
Ten is chilly
And zero is ice

h

10. Write the Celsius temperature (a multiple of ten) for each of these:

-a chilly day ___
-freezing water ___
-a very hot day ___
-a pleasant day ___
-boiling water

(11.) Identifying the appropriate measuring instrument for a task, given a list (maintained).

i

11. What measuring instrument would be best for each job?

-weighing a letter ____________
-finding a young baby's age ___________
-measuring milk for pancakes _________

(clock, stopwatch, ruler, tape measure, measuring cup, postal scale, bathroom scale, thermometer, calendar)

(12.) Identifying the appropriate unit of measurement, English or metric, from a list separated by English and metric (maintained).

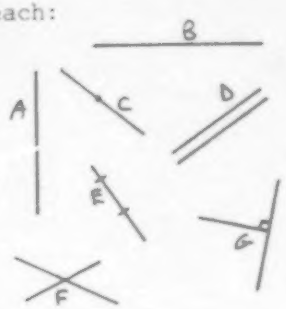
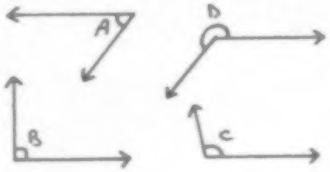
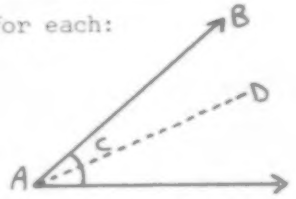
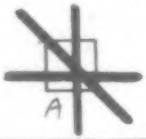
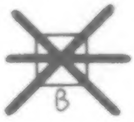
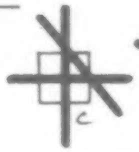
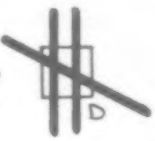
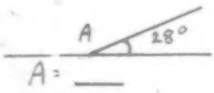
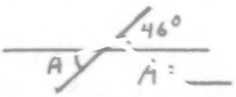
12. Which unit of measurement would be best for each situation?

	ENGLISH	METRIC
-a child's weight		
-the length of a piece of paper		
-the soup in a can		

ounces
pounds
tons
cups
pints
quarts
gallons
inches
feet
yards
miles
degrees F.

grams
kilograms
tonnes
milliliters
liters
kiloliters
millimeters
centimeters
meters
kilometers
degrees C.

LEVEL SEVEN E, F

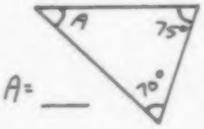
(13.) Estimating length, weight, capacity, and time. 1	13. About how long do you think it takes to walk a mile? 20 minutes 2 hours 5 hours
F. GEOMETRY (1.) Identifying terms dealing with lines given a map or isolated drawings (a list provided): line segment, point, vertical, horizontal, perpendicular, parallel, and intersecting (maintained) b	1. Write the letter for each: __point __line segment __parallel lines __perpendicular lines __intersecting lines __horizontal line __vertical line 
2. Identifying right, acute, obtuse, and reflex angles, given a list. c	2. Write the letter for each: __acute angle __right angle __reflex angle __obtuse angle 
(3.) Identifying a ray, vertex, angle, and bisector of an angle. c	3. Write the letters for each: __an angle __a ray __the vertex __a bisector of the angle 
4. Identifying a figure with two or more lines of symmetry drawn through it. d	4. Which figure has three lines of symmetry drawn through it?____    
5. Finding vertical and supplementary angles. 91 e	5. What is the missing angle in each figure?  

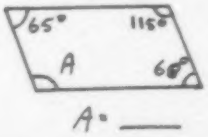
LEVEL SEVEN F

6. Finding a missing angle in a triangle and a quadrilateral, given the other angles.

e

6. What is the missing angle in each figure?





7. Distinguishing the differences and overlaps among the terms quadrilateral, square, rectangle, parallelogram, and trapezoid.

f

7. Write true or false by each statement:

-All quadrilaterals are squares. _____

-All squares are quadrilaterals. _____

-All rectangles are parallelograms. _____

-All parallelograms are rectangles. _____

-Some trapezoids are rectangles. _____

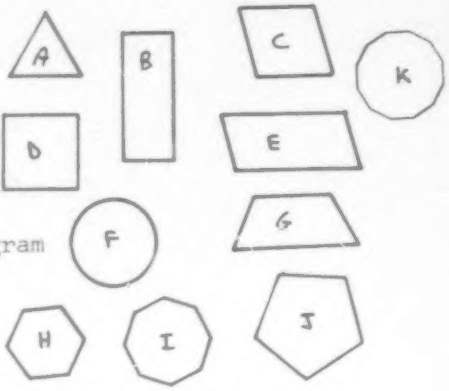
-Some parallelograms are squares. _____

(8.) Identifying polygons with up to twelve sides.

g

8. Write the letter for each shape by its name:

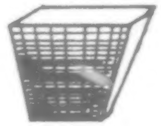
__hexagon
__triangle
__circle
__square
__pentagon
__rhombus
__rectangle
__parallelogram
__trapezoid
__octagon
__dodecagon



(9.) Identifying where these shapes appear in the real world (maintained).

g

9. What shape is the roof of the John Hancock Building? _____________



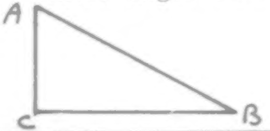
10. Identifying the equal sides and angles in congruent figures (maintained).

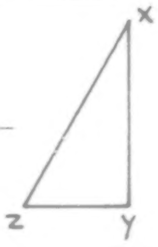
h

10. Triangle ABC ≅ triangle XYZ.

Which side is equal to AB? __

Which angle is equal to ABC? ___





LEVEL SEVEN F

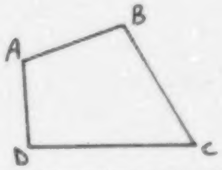
11. Identifying corresponding sides and equal angles in similar polygons (maintained).

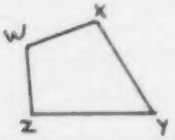
h

11. ABCD is similar to WXYZ.

Which angle is equal to ABC? ____

Which side in WXYZ corresponds to BC? ____





12. Identifying the characteristics of an isosceles, scalene, and equilateral triangle.

i

12. Write the name isosceles, scalene, or equilateral by each description:

-a triangle with all sides equal ________

-a triangle with two sides equal ______

-a triangle with three unequal sides ________

⑬ Finding the perimeter of any figure, given a word problem.

j

13. A man wanted to nail molding around the edge of the ceiling of a rectangular room 14 feet long and 11 feet wide. How many feet of molding would he need? ________

⑭ Finding the area of a rectangle or a square in a word problem, given the formula, answers in square units (maintained).

k

14. A woman wants to spread fertilizer on a lawn 25 feet long and 23 feet wide. How many square feet does she have to cover?

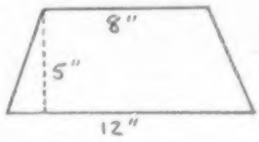
____

(A=lw)

⑮ Finding the area of any triangle, parallelogram, or trapezoid, given the formula, answers in square units.

k

15. What is the area of this trapezoid?



____

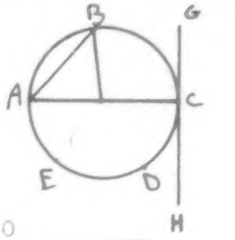
$(A = \frac{b+a}{2} \times h)$

⑯ Identifying center, diameter, radius, chord, arc, circumference, and tangent of a circle.

l

16. Write the name of each part of the circle by the letters:

diameter
radius
circumference
tangent
chord
arc
center



O ________

BO ________

AOC ________

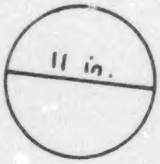
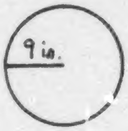
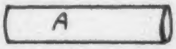
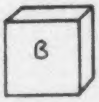
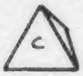
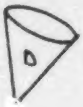
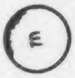
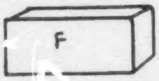
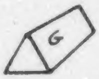
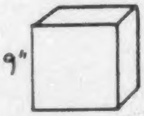
ED ________

ABCDE ________

GCH ________

AB ________

LEVEL SEVEN F, G

17. Finding the circumference of a circle, given the formula and the value of π (maintained). m	17. What is the circumference of this circle?  ________ (C=πd π=3.14)
18. Finding the area of a circle, given the formula and the value of π, answers in square units. m	18. What is the area of a circle whose radius is 9 inches?  ________ ($A=\pi r^2$ π =3.14)
⑲ Identifying seven geometric solids (cube, rectangular solid, cylinder, cone, sphere, pyramid, and triangular prism), and everyday objects that have that shape (maintained). n	19. Write the letter for each shape by its name or corresponding object. __rectangular solid __triangular prism __tonic can __pyramid __baseball __cube __cone       
20. Finding the surface area of solid figures, given the formula, answers in square units. o	20. What is the surface area of this cube?  ________ ($SA=6 \times E^2$)
㉑ Finding the volume of a rectangular solid or cube in a word problem, given the formula, answers in cubic units. p	21. What is the volume of a shoebox 12 inches long, 4 inches wide, and 3 inches deep? ________ (V=l x w x h)

G. ESTIMATING, GRAPHS, ETC.

① Rounding whole numbers off to any place up to billions. a	1. Round off to the nearest billion: 34,566,199,027 ________
② Rounding off decimals or mixed decimals to any place to the thousandths. a	2. Round to the nearest thousandth: 45.983666 ______

LEVEL SEVEN G

③ Estimating answers to word problems by rounding off, including area and volume problems (maintained).

b

3. A woman's restaurant bill came to $21.04. If he wanted to leave a tip of 15%, about how much should the tip be? ______

---

④ Identifying probability in word problems.

c

4. A man bought three lottery tickets. He found out that 15,000 tickets were sold in all. What are his chances of winning?

1 in 10 1 in 100 1 in 5,000

1 in 15,000

---

5. Working with set terminology: union and intersection, nul and empty, finite and infinite, etc. in numerical form or Venn diagrams.

d

5. A {5, 10, 15, 20...}

B {1, 2, 3, 4, 5}

What is the union of sets A and B? ______

What is the intersection? ______

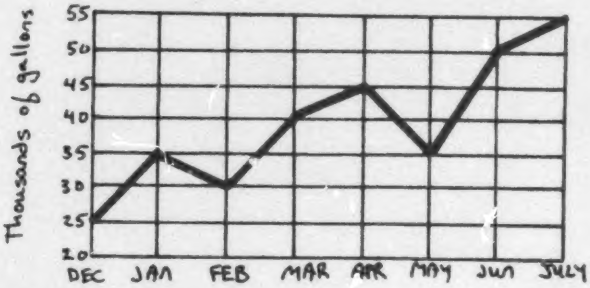
Which set is infinite? ___

---

⑥ Using picture, bar, line, and circle graphs with multiples on one coordinate to answer questions and solve problems.

e

6. This is a graph of the gasoline consumed by a fleet of trucks in an eight-month period.



How much gasoline was used in June? ______

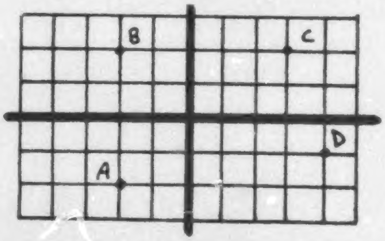
In which two months were 35,000 gallons used? ______

---

7. Plotting points on a Cartesian plane.

f

7. Which letter has the coordinates (4,-1)? ___



LEVEL SEVEN G

⑧ Identifying the median of a set of data (maintained).

g

8. What is the median height of the players on this basketball team? ____________

John - 180 cm.
Murray - 200 cm.
Ike - 162 cm.
Darryl - 207 cm.
Joey - 172 cm.

⑨ Getting information from a table or schedule.

h

9. How tall is the world's tallest building in meters? __________

How much taller is the Empire State Building than the Eiffel Tower? ________

The Ten Highest Buildings in the World

Name	Year completed	Ft.high	M.high
Sears Tower	1974	1450	442
World Trade Center	1972	1350	411
Empire State Building	1931	1250	381
Standard Oil	1971	1136	346
John Hancock Center	1967	1107	337
Chrysler, NYC	1930	1046	319
Eiffel Tower	1886	984	300
60 Wall Tower	1934	950	290
Dallas Tower	1979	913	278
Bank of Manhattan	1930	900	274

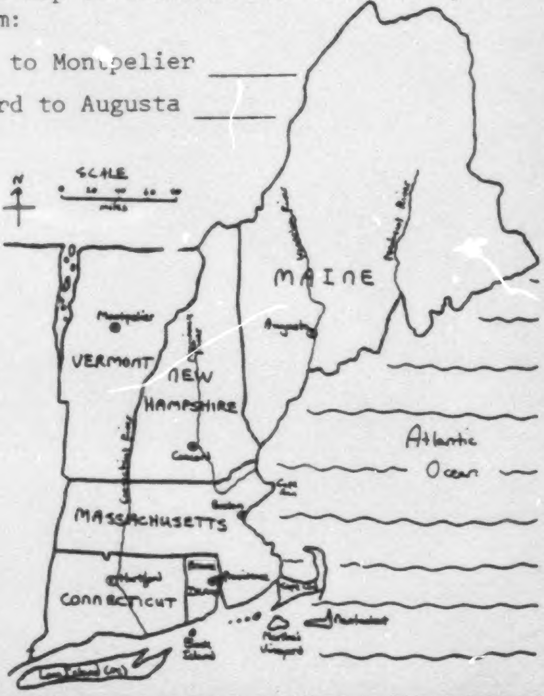
⑩ Getting distance information from a map or scale drawing (maintained).

i

10. Use this map to estimate the distance by air from:

Boston to Montpelier ______

Hartford to Augusta ______


SCALE
N
miles
MAINE
Montpelier
Augusta
VERMONT
NEW HAMPSHIRE
Concord
MASSACHUSETTS
Boston
CONNECTICUT
Hartford
Atlantic Ocean

118 objectives
69 circled

LEVEL EIGHT

A. NUMBERS AND NUMERATION

① Writing numerals to the hundred trillions place (maintained). a	1. Write seven trillion, two hundred ninety-three billion, ninety-one in numerals: ___
2. Using Roman numerals to two thousand (maintained). b	1. Write 1129 in Roman numerals: ___ Write MCDLXXXVII in Arabic numerals: ___
③ Identifying place value to the trillions place (maintained). c	3. In the number 7,829,012,653,400: How many ten millions? __ How many billions? __ How many trillions? __
4. Writing numbers in scientific notation and vice-versa. d	4. Write in scientific notation: 45,652,000,000 - ___ Write in standard notation: $(6.1 \times 10^9) + (8.45 \times 10^6)$ ___
⑤ Arranging any integers in order (maintained). i	5. Arrange these integers in order from the smallest to the largest value: -4 76 -1 0 54 -6 __ __ __ __ __ __
6. Giving the absolute value of a number. j	6. Which two integers have the same absolute value? -3 2 45 3 65 -32
7. Continuing a number sequence that rises in arithmetic or geometric steps (maintained). k	7. What are the next two numbers? 2, 4, 16, ___, ___
⑧ Identifying numbers divisible by 2, 3, 4, 5, 9, and 10, and odd and even numbers (maintained). m	8. Which are divisible by 5? 80 122 205 Which are odd numbers? 46 108 333
9. Identifying prime numbers up to five hundred. n	9. Which of these is a prime number? 102 173 155 201
10. Expressing a number up to 200 as a product of prime factors using exponential notation. o	10. Write the prime factors of 144 using exponential notation: ___

LEVEL EIGHT A, B

⑪ Expressing exponents in words and vice-versa (maintained). p	11. Write in words: 10^8 __________ 4^3 __________ Write in numeral form: twelve squared ___ five to the sixth ___
⑫ Writing products of ten as exponential powers of ten (maintained). p	12. Write as powers of 10: 10,000,000 - ____ 1,000,000,000,000 ____
13. Estimating the square root of non-perfect-square numbers under five hundred, rounded to the nearest tenth. q	13. What is the square root of 215, rounded to the nearest tenth? _____

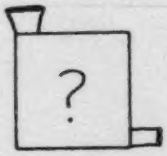
B. COMPUTATION

① Adding numbers with up to seven digits written vertically or horizontally (if horizontal, students need to stack numbers up correctly) (maintained). b	1. 4,556,001 + 54,330 = ________
② Subtracting numbers with up to eight digits written vertically or horizontally (if horizontal, students need to stack numbers up correctly) (maintained). c	2. 39,100,000 - 534,984 = ________
③ Multiplying 5-digit by 3-digit numbers written vertically or horizontally (maintained). d	3. 34,776 x 419 = ________
④ Dividing 5-digit by 3-digit numbers with remainders, written vertically or horizontally, quotients expressed as mixed fractions (maintained). e	4. 54,397 ÷ 467 = ______ (express the quotient as a mixed number)
⑤ Checking for errors in computation at this level. f	5. Circle any error or errors: $\begin{array}{r}3879\\4301\\396\\+\ 60\\\hline 9636\end{array}$ $\begin{array}{r}300000\\-17696\\\hline\end{array}$ $\begin{array}{r}5735\\\times 346\\\hline 34410\\22940\ \\17205\ \ \\\hline 1984301\end{array}$ $\begin{array}{r}284\\76\overline{)21584}\\\underline{152}\ \ \\638\ \\\underline{608}\ \\304\\\underline{304}\end{array}$

LEVEL EIGHT B

6. Using the twelve terms for different parts of computation problems without benefit of a list (addend, sum, minuend, subtrahend, difference, multiplicand, multiplier, product, divisor, dividend, quotient, remainder) (maintained).	g	6. What is the answer in an addition problem called? ______ What is the top number in a multiplication problem called? ______
7. Identifying integers and whole, rational, irrational, and real numbers.	g	7. Which of the numbers below are: Integers ______ Whole numbers ______ Rational numbers ______ Irrational numbers ______ Real Numbers ______ 3.5 6 -1 0 $\frac{2}{3}$ π $\sqrt{3}$ 9.3 $4.3\overline{3}$
⑧ Finding the average of a set of 3-digit whole numbers, decimals, or mixed decimals, presented in word problem form, rounding to the nearest whole number or decimal place.	h	8. What is the team batting average of these nine baseball players? .314 .211 .288 .122 .350 .233 .250 .300 .222 ______
9. Identifying how many times greater one multiple of ten, one hundred, or one thousand is than another, judging by by the addition of one, two, or three zeroes (maintained).	i	9. 749,000,000 is how many times as great as 749,000? ______
10. Applying the order of operations in expressions written without parentheses, using the acronym Please Excuse My Dear Aunt Sally (parenthesis, exponents, multiplication, division, addition and subtraction).	j	10. $3 + 4 \times 8 - 3^2 \times 4 =$ ______
⑪ Solving exponent problems with three or more parts and higher powers.	k	11. $8^3 + 7^2 + 2^7 =$ ______
12. Finding the product in exponential form of two or more positive integral powers with the same base.	$\boxed{1}$	12. Give the answer in exponential form: $7^2 \cdot 7^4 \cdot 7^3 =$ ______
13. Finding the product in exponential form of two or more positive and negative integral powers with the same base.	$\boxed{1}$	13. Give the answer in exponential form: $5^{-6} \cdot 5^2 =$ ______

LEVEL EIGHT B

<table>
<tr><td>14. Finding the quotient in exponential form of a positive and negative integral power with the same base.
l</td><td>14. Give the answer in exponential form:
$8^{-4} \div 8^{2} =$ ____</td></tr>
<tr><td>15. Adding, subtracting, multiplying, and dividing integers.
m</td><td>15. $-3 + (-7) =$ ____ $-4 \times 7 =$ ____</td></tr>
<tr><td>16. Translating a word phrase to a literal expression.
n</td><td>16. Write this as a literal expression:
Five less than the sum of two numbers, a and b.
____________</td></tr>
<tr><td>17. Solving an equation with one variable and two operations.
o</td><td>17. $2a + 40 = 60$ $a =$ ___</td></tr>
<tr><td>18. Finding the value of an open phrase with two variables, given the value of the variables.
p</td><td>18. $a + b + 17 =$ ____ $(a=12, b=15)$</td></tr>
<tr><td>19. Deducing the two-step rule of a function machine and using the rule to determine further output.
q</td><td>19. Figure out the rule to this function machine and use it to fill in the blank output spaces.

<table>
<tr><th>INPUT</th><th>OUTPUT</th></tr>
<tr><td>1</td><td>1</td></tr>
<tr><td>2</td><td>4</td></tr>
<tr><td>3</td><td>7</td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
</table></td></tr>
<tr><td>⑳ Identifying the missing information needed to solve a word problem that has insufficient information.
r</td><td>20. The sun is 93 million miles from the Earth. How long would it take a meteor to travel from the sun to the earth?
What additional information do you need to solve this problem?
____________</td></tr>
<tr><td>㉑ Solving one, two, and three-step word problems involving computation at this level, some including extraneous information.
s</td><td>21. A woman saved $150 a month from her $850-a-month salary. How long would it take her to save up enough money to buy five $48 dining room chairs? ________</td></tr>
</table>

LEVEL EIGHT C

C. FRACTIONS

① Finding what fractional part one number is of another. a	1. 8 is what fractional part of 12? ____
2. Arranging fractions in order of size (maintained). b	2. Arrange these fractions in order from smallest to largest: $\frac{3}{4}$ $\frac{5}{14}$ $\frac{1}{2}$ $\frac{4}{9}$ $\frac{3}{5}$ $\frac{2}{11}$ ____ ____ ____ ____ ____ ____
3. Finding the fraction half way between two fractions (maintained). b	3. What fraction is half way between $\frac{1}{3}$ and $\frac{7}{8}$? ____
4. Finding the fraction which when added to a given fraction makes one whole (maintained). c	4. $\frac{3}{19} + \text{____} = 1$
⑤ Finding a fractional part of a large number, expressed in lowest terms, in word problem form (maintained). e	5. A race was 2500 meters long. A man had covered 500 meters. What fraction of the race had he covered, in the simplest terms? ____
⑥ Adding two or three mixed fractions with unlike denominators with regrouping, written vertically or horizontally, answers in simplest terms (maintained). g	6. $\begin{array}{r} 5\frac{7}{8} \\ +2\frac{4}{5} \\ \hline \end{array}$ $4\frac{1}{3} + 6\frac{2}{5} + 8\frac{1}{9} =$ ____
⑦ Subtracting mixed fractions with unlike denominators with regrouping, written vertically or horizontally, answers in simplest terms. g	7. $\begin{array}{r} 8\frac{3}{5} \\ -3\frac{6}{7} \\ \hline \end{array}$ $12\frac{3}{8} - 5\frac{1}{2} =$ ____
⑧ Multiplying two or three common fractions, mixed fractions, or whole numbers, including finding a fraction of money, simplified answers (maint.) h	8. $6 \times 8\frac{3}{4} \times \frac{8}{9} =$ ____ $\frac{1}{3}$ of \$66 = ____
⑨ Dividing common fractions, mixed fractions, or whole numbers, answers in simplest terms (maintained). i	9. $6\frac{4}{5} \div 9\frac{1}{2} =$

10. Identifying numerator, denominator, reciprocal, mixed fraction, and improper fraction without benefit of a list (maintained). j	10. In the fraction 3/5, what is the 5 called? ____ What is the term for fractions where the numerator is as large as or larger than the denominator? ____ What is the reciprocal of 3/5? ____
⑪ Solving ratio and proportion problems in practical situations (maintained). k	11. A pancake mix calls for two eggs for every three cups of milk. If you use six eggs, how many cups of milk should you put in? ____
12. Solving ratio and proportion problems with fractions and mixed numbers. k	12. $2:2\frac{1}{2} = 5:$____
⑬ Finding a number when a fractional part of it is known. l	13. 18 is $\frac{5}{9}$ of what number? ____
⑭ Solving one, two, and three-step word problems involving fractions at this level. l	14. A recipe called for $1\frac{2}{3}$ cups of milk. If you wanted to make five times what the recipe called for, how much milk would you need? ____

D. DECIMALS AND PERCENT

① Writing mixed decimals to the ten millionths place. b	1. Write eight and forty-nine ten millionths in numerals: ____
② Identifying decimal place value to the ten millionths place. c	2. In the number 35.9812407: How many millionths? ____ How many ten thousandths? ____ How many hundredths? ____
3. Writing decimals in expanded form. d	3. Write .3614 in expanded form: ____
4. Writing mixed decimals in expanded form using exponential notation. d	4. Write in expanded form using exponential notation: 4.00791 ____

LEVEL EIGHT D

5. Arranging decimals in order of size (maintained). e	5. Arrange these decimals in order from the smallest to the largest: .109 .32 .047 .001 .1001 ____ ____ ____ ____ ____
6. Identifying equivalent decimals when some have redundant zeroes to the right of the last digit (maintained). f	6. Which has the same value as .045? .450 .0450 .0045 .4550
7. Writing a number containing billions and hundred millions in abbreviated decimal notation, given an example from a newspaper headline. g	7. A newspaper headline says that a deficit will increase by $4.7b. Write this amount in standard form: ________
8. Adding and subtracting decimals and mixed decimals with different numbers of decimal places, written horizontally (students need to stack numbers up correctly) (maintained). i	8. 6.9 + .0024 + 387 = ______ 64 - .00246 = ______
9. Multiplying decimals, mixed decimals, and whole numbers, some problems needing one or more zeroes to the left of the product, written vertically or horizontally (maintained). j	9. .037 x .0081 = ________ .35 of 599 = ______
10. Dividing decimals, mixed decimals, and whole numbers with 3-digit divisors, some with additional zeroes required in the dividend answers rounded to a specific place. k	10. 78 ÷ .0132 = ______
11. Dividing by a power of ten by moving the decimal point. k	11. Divide 3.94 by 10^3 by moving the decimal point. ______
12. Changing any common or mixed fraction to a decimal, rounded to a specified number of decimal places. l	12. Write $\frac{8}{11}$ as a decimal, rounded to the thousandths place. ____
13. Changing any decimal or mixed decimal to a percent. m	13. Change to percents: 3.0012 = ____ % .1386 = ____ %

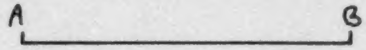
LEVEL EIGHT D, E

14. Changing any percent to a decimal. m	14. Change to decimals: 235% = _____ .02% = _____
⑮ Changing any fraction to a percent. n	15. Change to percents: $\frac{2}{3}$ = ____ % $\frac{1}{12}$ = ____ %
⑯ Finding the percent of a whole number or mixed decimal when the percent is a mixed decimal or more than one hundred (maintained). o	16. What is 125% of 600? ______ What is .3% of $35? _____
⑰ Finding what decimal part one number is of another. p	17. 18 is what decimal part of 25? ____
18. Finding what percent one number is of another, including percents over one hundred. p	18. 85 is what percent of 80? _____
19. Finding a number when a decimal part of it is known. q	19. 28 is .35 of what number? ____
20. Finding a number when the percent is known, including percents over one hundred. q	20. 105 is 150% of what number? ____
㉑ Solving one, two, and three-step word problems involving decimals and percent at this level, including problems with discounts, compound interest, gross and net profit, mark-ups, and commissions. r	21. A man puts $1200 into a savings account that pays 8½% interest compounded annually. How much will his account be worth after three years? __________

E. MEASUREMENT

① Calculating elapsed time given two points in time in digital or conventional readings (maintained). a	1. A hockey match began at eight fifteen and ended at 11:50. How long did it last? __________
② Adding and subtracting three-part measures of time with regrouping. b	2. 5 days 4 hours 15 minutes +4 days 23 hours 52 minutes

LEVEL EIGHT E

③ Telling the number of days in each month (maintained). c	3. How many days are there in July? ___ How many days in February, 1982? ___
④ Interpreting and writing dates in numerical form (maintained). c	4. What month, day, and year does 10/1/83 mean? ____________________ Write March 31, 1983 in numerical form: ___/___/___
⑤ Using an English and metric ruler to measure a line segment (maintained). d	5. How long is the line AB in inches? ____ How long in metric measurement? ____ 
⑥ Adding and subtracting three-part linear measurements within the English and metric systems, with regrouping. e	6. 6 miles 7 feet 4 inches -2 miles 12 feet 9 inches
⑦ Adding and subtracting three-part capacity measurements within the English and metric systems, with regrouping. f	7. 6 gallons 3 quarts 1 pint +8 gallons 2 quarts 1 pint
⑧ Adding and subtracting three-part weight measurements within the English and metric systems, with regrouping. g	8. 6 kilograms 13 grams 34 milligrams +4 kilograms 83 grams 70 milligrams
⑨ Applying knowledge of the boiling and freezing points of water and of normal body temperature in degrees Fahrenheit to do simple word problems (maintained). h	9. If the temperature on a cold winter day was 24 degrees Fahrenheit below freezing, what was the temperature? ____
⑩ Knowing the approximate Celsius temperature for a hot day, a mild day, and a cold day, and the exact reading for the boiling and freezing point of water (maintained). The following verse is helpful: Thirty is steamy, twenty is nice Ten is chilly and zero is ice h	10. Write the Celsius temperature (a multiple of ten) for each of these: -boiling water ___ -a very hot day ___ -freezing water ___ -a pleasant day ___ -a chilly day ___

LEVEL EIGHT E

⑪ Identifying the appropriate measuring instrument for a task, given a list (maintained).

i

11. What measuring instrument would be best for each job?

-timing a swimming race ____________
-weighing yourself ____________
-measuring your waist ____________

(clock, stopwatch, ruler, tape measure, measuring cup, postal scale, bathroom scale, thermometer, calendar)

---

⑫ Identifying the appropriate unit of measurement, English or metric, from a list separated by English and metric (maintained).

j

12. Which unit of measurement would be best for each situation?

	ENGLISH	METRIC
-temperature outside		
-weighing a truck		
-length of this piece of paper		

ounces	grams
pounds	kilograms
tons	tonnes
cups	milliliters
pints	liters
quarts	kiloliters
gallons	millimeters
inches	centimeters
feet	meters
yards	kilometers
miles	degrees Cent.
degrees Fahr.	

---

13. Converting between English and metric measurements, given a formula.

k

13. A woman has 25.8 liters of gasoline put in her car. How many gallons is that? (liters/3.8 = gallons)

____

It is 75°F. outside. What is that in degrees Celsius? (5/9 (F.-32) = C.)

______

---

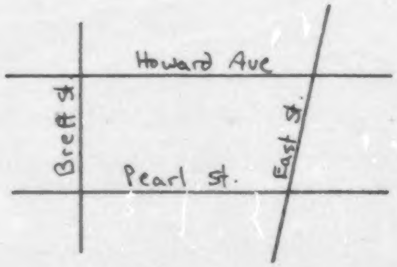
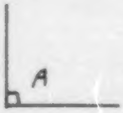
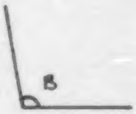
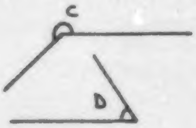
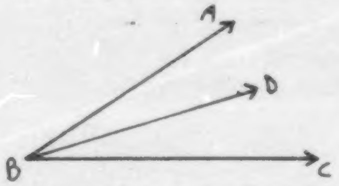
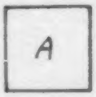
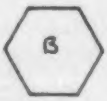
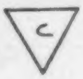
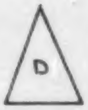
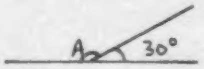
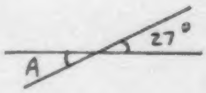
⑭ Estimating length, weight, capacity, and time.

l

14. About how long do you think the average classroom is?

10 feet 30 feet 75 feet

F. GEOMETRY

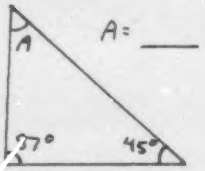
1. Identifying terms dealing with lines and angles on a map or in isolated drawings: line segment, point, vertical, horizontal, perpendicular, right angle, parallel, and intersecting (maintained). b	1. What street runs parallel to Howard Ave? ____  What street runs perpendicular to Pearl Street? ____ How many intersections are there? ___
2. Identifying right, acute, obtuse, and reflex angles. c	2. Which is an acute angle? ___   
3. Identifying a ray, vertex, angle, and bisector of an angle (maintained). c	3. Which line bisects the angle ABC? ____ 
4. Identifying a figure that can have one or more lines of symmetry drawn through it. d	4. Which figure can have only one line of symmetry drawn through it? ___    
5. Finding vertical, supplementary, complementary, and reflex angles. e	5. What is the missing angle in each figure?  A = ___  A = ___

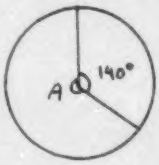
LEVEL EIGHT F

6. Finding a missing angle in a triangle or quadrilateral, or a missing interior angle in a circle.

e

6. What is the missing angle in each figure?





7. Naming different quadrilaterals from a description.

f

7. Which quadrilateral matches each description? (Square, rectangle, non-rectangular parallelogram, rhombus, trapezoid)

-all sides equal, all angles 90° ______

-two sides parallel, the other two not ________

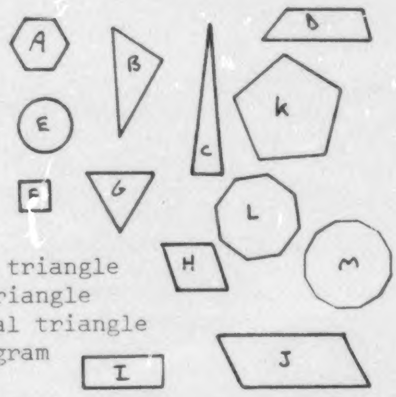
-all sides equal, opposide sides parallel, angles not 90° ___________

⑧ Identifying polygons with up to twelve sides.

g,i

8. Write the letter for each shape by its name:

__dodecagon
__octagon
__trapezoid
__rectangle
__rhombus
__pentagon
__square
__circle
__isosceles triangle
__scalene triangle
__equilateral triangle
__parallelogram
__hexagon



⑨ Identifying where these shapes appear in the real world (maintained).

g

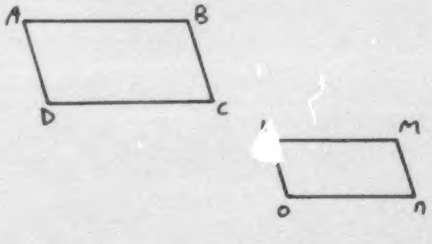
9. What shape is one side of a Rubik's cube? ________

10. Matching sides and angles of similar or congruent figures.

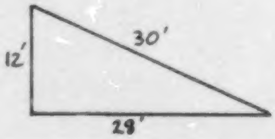
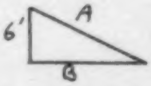
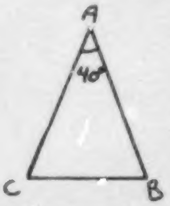
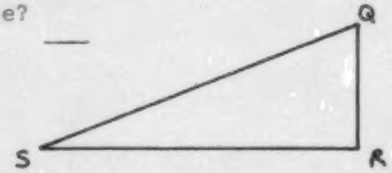
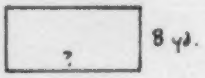
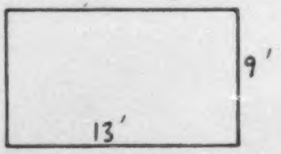
h

10. LMNO is similar to ABCD. Which sides and angles in the smaller figure correspond to these in ABCD?

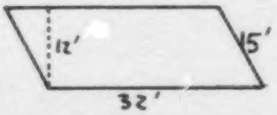
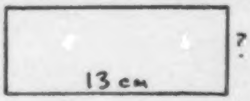
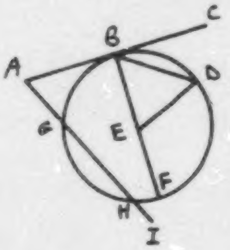
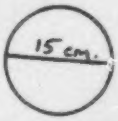
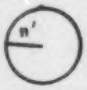
AB ___
CD ___
∠C ___
∠B ___



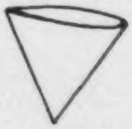
LEVEL EIGHT F

11. Using ratios to find the missing dimensions of similar triangles. h	11. These two triangles are similar. What is the length of side A? ___ What is the length of side B? ___  
12. Finding two missing angles in an isosceles triangle by applying the fact that the two base angles are equal. e,i	12. ABC is an isosceles triangle. If the angle BAC is 40°, what are the other two angles? ABC ____ ACB ____ 
⑬ Identifying the hypotenuse of a right triangle. i	13. Which side of this triangle is the hypotenuse? ___ 
⑭ Finding the perimeter of any figure, given a word problem (maintained). j	14. A woman wanted to put chicken wire around the perimeter of her vegetable garden to keep the rabbits out. The garden was a rectangle 15 feet long and 12 feet wide. How much chicken wire would she have to buy? ________
15. Finding the other dimension of a rectangle, given one dimension and the perimeter. j	15. If the perimeter of this rectangle is 56 yards and the width is 8 yards, what is the length? ________ 
⑯ Finding the area of a rectangle or a square in a word problem, given the formula, answers in square units (maintained). k	16. A man wants to put wall-to-wall carpeting in a room 13 feet long and 9 feet wide. How much carpet should he buy? ________  (A=lxw)

LEVEL EIGHT F

17. Finding the area of any triangle, parallelogram, or trapezoid, given the formula, answers in square units (maintained). k	17. What is the area of this parallelogram?  ________ (A=bxa)
18. Finding the other dimension of a rectangle, given one dimension and its area. k	18. What is the width of this rectangle if it is 13 centimeters long and has an area of 65 square centimeters? ________ 
19. Identifying center, diameter, radius, chord, tangent, arc, secant, semicircle, and circumference of a circle. l	19. Write the name of each part of the circle by the letters: diameter radius chord tangent secant arc semicircle circumference center  ABC ________ HF ________ BD ________ E ________ BEF ________ AGH ________ ED ________
20. Finding the circumference of a circle, given the formula and the value of π (maintained). m	20. What is the circumference of a circle whose diameter is 15 centimeters?  ________ ($C=\pi d$, $\pi=3.14$)
21. Finding the area of a circle, given the formula and the value of π, answers in square units (maintained). m	21. What is the area of a circle whose radius is 11 feet? ________ ($A=\pi r^2$, $\pi=3.14$) 
22. Identifying where geometric solids (cube, rectangular solid, cylinder, cone, sphere, pyramid, and triangular prism) appear in everyday life. n	22. Choose from the list of geometric solids the one that has the shape of: -a shoebox ________ -a basketball ________ -a witch's hat ________ -a garden hose ________ pyramid cylinder cone cube sphere rectangular solid

LEVEL EIGHT F, G

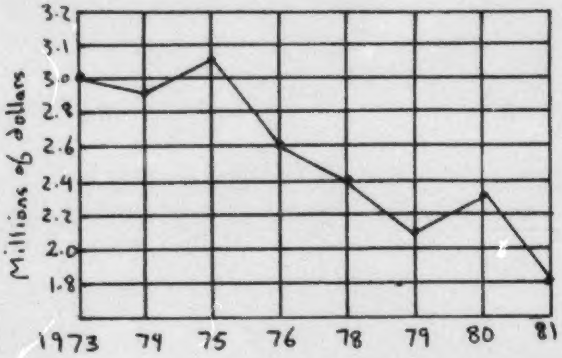
23. Finding the surface area of solid figures, given the formula, answers in square units (maintained). o	23. What is the surface area of this sphere of radius 3 inches? ______ ($SA=4\pi r^2$, $\pi=3.14$)
㉔ Finding the volume of a rectangular solid or cube in a word problem, given the formula, answers in cubic units. p	24. How many cubic feet of water can you put into a swimming pool 25 feet long, 14 feet wide, 7 feet average depth? ______ ($V=l \times w \times h$)
25. Finding the volume of other geometric solids, given the formula, answers in cubic units. p	25. What is the volume of this cone (radius is 3 centimeters, height is 7 centimeters)?  ______ ($V=\frac{1}{3}\pi r^2 h$, $\pi=3.14$)

G. ESTIMATING, GRAPHS, ETC.

① Rounding whole numbers to any place up to hundred trillions. a	1. Round off to the nearest hundred billion: 2,364,219,746,331 ______
② Rounding decimals to any place to thousandths (maintained). a	2. Round to the nearest cent: $14.6666666 ______
③ Estimating answers to word problems by rounding off, including area and volume problems (maintained). b	3. A family driving cross country covered 510 miles the first day, 489 the second, 290 the third, and 610 the fourth. About how far did they travel in all in those four days? ______
④ Identifying probability in word problems (maintained). c	4. A weather forcaster says there is a 40% chance of rain. What is the chance that it will not rain? 1 in 4 1 in 6 3 in 5 2 in 5
5. Finding the intersection, union, and complement of sets, recognizing disjoint sets, using numerical form or Venn diagrams. d	5. What is the union of sets A and B? ______ What is the intersection? ______ A. {4, 5, 6, 7, 8...} B. {6, 8, 10, 12, 14}

⑥ Using picture, bar, line, and circle graphs with multiples on one coordinate to answer questions and solve problems (maintained).

6. This is a graph of a city's expenditures over a period of years.



In what year did the city spend $2,100,000? ____

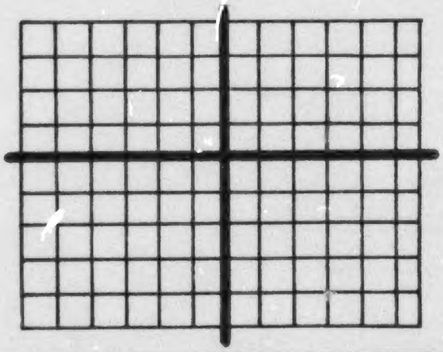
What was the drop from the highest year's expenditure to the lowest?

____

e

7. Plotting points on a Cartesian plane (maintained).

7. Plot these points on the Cartesian plane and label: (-3,5) A (3,-4) B



f

⑧ Identifying the median of a set of data (maintained).

8. What is the median height of these buildings: __________

Sears Tower - 1450 ft.
World Trade Center - 1350 ft.
Empire State Building - 1250 ft.
Standard Oil Building - 1136 ft.
John Hancock Tower - 1107 ft.
Chrysler Building - 1046 ft.

g

LEVEL EIGHT G

⑨ Getting information from a table or schedule (maintained).

h

9. Use the table below to answer these questions:

In which country do women have the lowest life expectancy? ________

What is the average life expectancy of men in Denmark? _____

How much longer do women live than men in Canada? ______

Ten Countries with Highest Life Expectancies

	MEN	WOMEN	AVERAGE
Sweden	71.8	76.5	74.2
Netherlands	71.0	76.4	73.7
Iceland	70.8	76.2	73.5
Norway	71.0	76.0	73.5
Denmark	70.6	75.4	73.0
Ryukyu Islands	68.9	75.6	72.3
Canada	68.7	75.2	72.0
France	68.0	75.5	71.7
Japan	69.0	74.3	71.7
United Kingdom	68.5	74.7	71.6

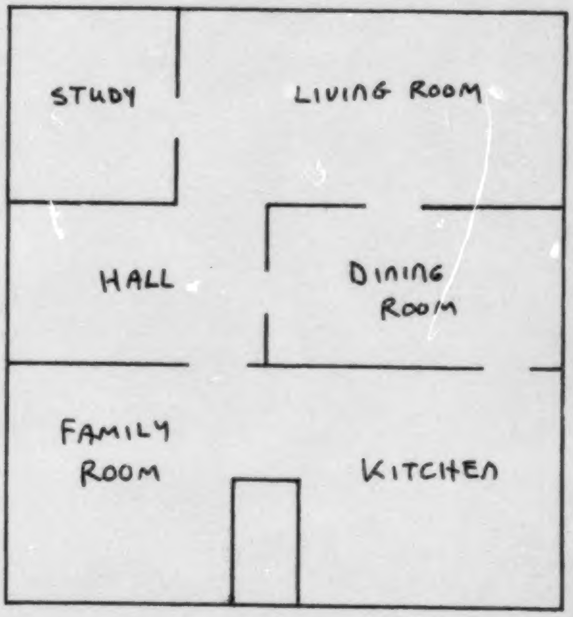
⑩ Getting distance information from a map or scale drawing (maintained).

i

10. This is a scale drawing of one floor of a house.

How long and wide is the living room? _____

How many square feet of carpeting would be needed for the study? ___________



SCALE: 1 in. = 10 ft.

LEVEL CHECKLISTS

The following pages are compact checklists for the objectives at each level. Each checklist contains the wording used in the left-hand column of the main document, and the numbering system is the same. Priority objectives, which are circled in the main document, are starred on these pages.

These checklists can serve a number of purposes, among them:

- to keep track of objectives covered in the course of the year
- to keep track of individual student's progress
- to inform parents of academic goals for the year and keep them informed of their children's progress
- to serve as a compact reference for materials and sequencing of instruction

The space to the left of each objective can be used for checks, to write brief notations, or can be divided up into thirds or quarters to provide several boxes for periodic check-ups of students' progress. Below are three possible uses of the space.

A. NUMBERS AND

✓	1. Identi
	2. Solving
✓	3. Putting

A. NUMBERS AND

Text p. 43	1. Identi
Worksheet	2. Solving
Overhead	3. Putting

A. NUMBERS AND

✓	✓	✓	✓	1. Identi
		✓	✓	2. Solving
	✓			3. Putting

Please note that the descriptions of objectives in these checklists do not include all the information in the left-hand column; some qualifications and explanations are missing. It is important to refer back to the main body of this curriculum for full descriptions of objectives and the specific examples given in the right-hand column.

KINDERGARTEN MATH CHECKLIST

33 objectives, of which 33
are priority items (starred)

A. NUMBERS AND NUMERATION

☆ ☐ 1. Counting one to twenty objects
☆ ☐ 2. Writing numerals from one to twenty
☆ ☐ 3. Matching numbers with corresponding sets of objects up to twenty
☆ ☐ 4. Finding ordinal position from first to fifth
☆ ☐ 5. Counting backward from ten to one
☆ ☐ 6. Determining one more than or one less than a number under twenty
☆ ☐ 7. Identifying which two groups in a larger group have an equal number of objects
☆ ☐ 8. Identifying which of two groups of objects has more and which has less
☆ ☐ 9. Knowing number sequence from one to twenty

B. COMPUTATION

☆ ☐ 1. Combining two groups of objects and telling how many objects there are in all
☆ ☐ 2. Finding the number of objects remaining when some are taken away
☆ ☐ 3. Identifying objects that come in pairs
☆ ☐ 4. Identifying the older or younger of two children under ten

C. FRACTIONS

☆ ☐ 1. Identifying a figure that has been cut in half
☆ ☐ 2. Identifying the middle object in an odd-numbered row

D. DECIMALS AND PERCENT

☆ ☐ 1. Identifying a penny, nickel, dime, and quarter given real coins or pictures

E. MEASUREMENT

☆ ☐ 1. Telling time from a clock face reading exactly on the hour
☆ ☐ 2. Identifying whether before or after is the appropriate word in an everyday situation
☆ ☐ 3. Visually comparing objects and telling which is largest, smallest, longest or tallest, and shortest
☆ ☐ 4. Visually comparing the contents of cups or jars and telling which holds most, more, or less
☆ ☐ 5. Identifying a clock or watch as an instrument to tell time
☆ ☐ 6. Identifying hours as a measure of time

F. GEOMETRY

☆ ☐ 1. Identifying whether an object is outside or inside a shape
☆ ☐ 2. Identifying top, bottom, and middle
☆ ☐ 3. Copying a simple pattern of dots
☆ ☐ 4. Identifying which of two objects is larger or smaller
☆ ☐ 5. Knowing left and right
☆ ☐ 6. Matching a two-dimensional shape with an identical one mixed in with other shapes
☆ ☐ 7. Identifying circles, squares, triangles, and rectangles
☆ ☐ 8. Counting area squares in a rectangle or square with twelve or fewer units
☆ ☐ 9. Identifying straight and curved lines
☆ ☐ 10. Matching common geometric solids and everyday objects

G. ESTIMATING, GRAPHS, ETC.

☆ ☐ 1. Reading a simple picture graph

LEVEL ONE MATH CHECKLIST

53 objectives, of which 43
are priority items (starred)

A. NUMBERS AND NUMERATION

☆ ☐ 1. Writing numerals from zero to ninety-nine
☆ ☐ 2. Identifying other ways of writing a given number up to ninety-nine
☆ ☐ 3. Identifying place value to the tens place
☆ ☐ 4. Finding ordinal position from first to tenth
☆ ☐ 5. Counting backward from twenty to one
☆ ☐ 6. Writing the number before or after a given number, or the number between two numbers, up to ninety-nine
☆ ☐ 7. Using the symbols for greater than, less than, and equal to in comparing pairs of numbers
☆ ☐ 8. Skip counting by twos to twenty, fives to fifty, and tens to one hundred
☆ ☐ 9. Identifying odd and even numbers one to ten

B. COMPUTATION

☆ ☐ 1. Memorizing addition facts to ten
☆ ☐ 2. Memorizing subtraction facts to ten
☆ ☐ 3. Adding two 2-digit numbers or one 2-digit and one 1-digit number with no regrouping
☆ ☐ 4. Adding three numbers written in vertical or horizontal format, the sum less than twelve
☆ ☐ 5. Subtracting 2-digit numbers or a 1-digit from a 2-digit number with no regrouping
☐ 6. Adding and subtracting from right to left (in preparation for regrouping at level two)
☐ 7. Solving addition problems involving up to three of the same number under four
☆ ☐ 8. Dividing an even-numbered row of objects into pairs
☐ 9. Applying the principle that the addends in addition problems can be reversed and still give the same sum
☐ 10. Writing addition and subtraction equations for picture problems
☐ 11. Finding the missing addend in an open number sentence, the sum under ten
☐ 12. Finding the missing subtrahend in an open number sentence of 1-digit numbers
☆ ☐ 13. Solving simple word problems involving addition and subtraction with answers up to ten

C. FRACTIONS

☆ ☐ 1. Identifying a whole, half, third, and fourth of an object
☐ 2. Estimating half the capacity of a container
☐ 3. Dividing an even-numbered row of ten or fewer objects into equal groups

D. DECIMALS AND PERCENT

☆ ☐ 1. Matching the names of coins (pennies, nickels, dimes, quarters, and half dollars) with pictures
☆ ☐ 2. Knowing the exchange rate between pennies, nickels, and dimes
☆ ☐ 3. Finding the value of two or three coins worth less than twenty cents, answers in cents notation (¢)
☐ 4. Calculating change from 25 cents, no regrouping

E. MEASUREMENT

☆ ☐ 1. Telling time from a clock face reading on the hour or half hour
☆ ☐ 2. Identifying the sequence of morning, noon, afternoon, evening, night, midnight
☆ ☐ 3. Identifying the order of the days of the week
☆ ☐ 4. Identifying the order of the months of the year
☆ ☐ 5. Identifying the order of the seasons
☆ ☐ 6. Judging the length of an object exactly two or three inches long held up against a drawing of a ruler
☆ ☐ 7. Comparing the capacity of several cylindrical containers with the same diameter
☆ ☐ 8. Comparing everyday objects and judging which is heavier or lighter
☆ ☐ 9. Comparing temperature of the seasons and judging which is hotter or colder, hottest or coldest
☆ ☐ 10. Identifying a clock or watch as an instrument to tell time and a ruler as an instrument to measure distance
☆ ☐ 11. Identifying appropriate units of time (hours and minutes) and linear measure (feet and inches)

F. GEOMETRY

☆ ☐ 1. Identifying the inside and outside of a closed region
☆ ☐ 2. Writing a letter on, above, or below a point of reference
☆ ☐ 3. Identifying the largest or smallest object in a group
☆ ☐ 4. Identifying straight and curved lines
☐ 5. Identifying figures with a line of symmetry drawn through them, expressed in terms of cutting the figure in half
☆ ☐ 6. Picking a shape that is similar out of a group of other shapes
☆ ☐ 7. Identifying a square, rectangle, triangle, and circle
☆ ☐ 8. Relating the four basic shapes to everyday objects
☆ ☐ 9. Matching shapes with the same size (congruent figures)
☆ ☐ 10. Counting small squares in a larger square or rectangle (twenty units or less)
☆ ☐ 11. Recognizing a closed curve and an open curve
☆ ☐ 12. Identifying a drawing of a common geometric solid that looks like an everyday object (cube, sphere, etc.)

G. ESTIMATING, GRAPHS, ETC.

☆ ☐ 1. Getting information from or partly filling in a simple picture graph

LEVEL TWO MATH CHECKLIST

57 objectives, of which 49
are priority items (starred)

A. NUMBERS AND NUMERATION

☆ ☐ 1. Writing numbers from zero to nine hundred ninety-nine
☆ ☐ 2. Identifying other ways of writing a given number up to ninety-nine
☆ ☐ 3. Identifying place value to the hundreds place
☆ ☐ 4. Using ordinal numbers from first through twentieth
☐ 5. Counting backward from any number under one hundred
☆ ☐ 6. Writing the number before or after a given number, or the number between two numbers, from zero to 999
☆ ☐ 7. Comparing numbers using greater than, less than, and equal to signs
☆ ☐ 8. Skip counting by twos, fives, and tens to one hundred, and by hundreds to one thousand
☆ ☐ 9. Identifying odd and even numbers one to twenty

B. COMPUTATION

☆ ☐ 1. Memorizing addition and subtraction facts to eighteen
☆ ☐ 2. Adding a 1- and a 2-digit number and two 2-digit numbers with regrouping
☆ ☐ 3. Adding three 1-digit numbers
☆ ☐ 4. Subtracting a 1- from a 2-digit number with regrouping
☆ ☐ 5. Subtracting two 2-digit numbers with regrouping
☆ ☐ 6. Adding the same number several times, sums under eighteen
☆ ☐ 7. Dividing a row of objects into pairs or groups of three (no remainders)
☆ ☐ 8. Checking for errors in addition and subtraction problems at this level
☐ 9. Finding ten greater than and ten less than a given number under eighty-nine
☐ 10. Applying the principle that the addends in addition problems can be reversed without changing the sum
☐ 11. Writing addition and subtarction equations for simple word problems
☐ 12. Finding the missing addend in an open number sentence, the sum less than twenty
☐ 13. Finding the missing subtrahend in an open number sentence, numbers under twenty
☆ ☐ 14. Solving word problems involving addition and subtraction at this level

C. FRACTIONS

☆ ☐ 1. Writing fraction numbers for fraction words: one half, one third, two thirds, one fourth, and three fourths
☆ ☐ 2. Writing the correct fraction for the shaded region of a figure (same fractions as above)
☆ ☐ 3. Finding one half of an even-numbered row of objects

D. DECIMALS AND PERCENT

☆ ☐ 1. Writing the names of coins, given pictures and a list
☆ ☐ 2. Reading and writing money expressions under one dollar, using the cents sign (¢)
☆ ☐ 3. Finding the value of several coins whose value does not exceed one dollar
☆ ☐ 4. Solving simple word problems involving computing change for purchases of items under $1.00 paid for with under $1.00

E. MEASUREMENT

☆ ☐ 1. Telling time from a clock face whose minute hand is on any five-minute mark
☆ ☐ 2. Telling time from a digital clock reading on any five-minute mark
☆ ☐ 3. Identifying A.M. and P.M. as abbreviations for morning and afternoon/evening
☆ ☐ 4. Comparing the basic units of time: hours, minutes, and seconds, days and weeks, months and years
☆ ☐ 5. Knowing the order of the days of the week
☆ ☐ 6. Knowing the order of the seasons
☆ ☐ 7. Naming any month given its number in order
☆ ☐ 8. Naming the day of the week on a calendar, given the date
☆ ☐ 9. Using a ruler to measure a line segment that is exactly one, two, three, four, etc. inches long
☆ ☐ 10. Arranging four cylindrical containers with the same diameter in order of capacity
☆ ☐ 11. Comparing the basic units of weight - ounces, pounds, and tons - with everyday objects
☆ ☐ 12. Understanding that the higher the reading on a thermometer, the warmer the temperature is, and vice-versa
☆ ☐ 13. Identifying the function of a clock or watch, a ruler, a thermometer, a scale, and a measuring cup
☆ ☐ 14. Identifying the best unit of measure within each area (e.g. inches, feet, or yards in linear measurement)
☆ ☐ 15. Estimating length, weight, and time

F. GEOMETRY

☆ ☐ 1. Identifying upper, lower, left, and right
☆ ☐ 2. Identifying the point where two lines intersect
☐ 3. Identifying figures with a line of symmetry drawn through them, expressed in terms of being cut in half
☆ ☐ 4. Classifying shapes by the number of sides
☐ 5. Identifying a rectangle and a square in a set of quadrilaterals
☆ ☐ 6. Identifying basic shapes: square, circle, rectangle, triangle
☆ ☐ 7. Relating the four basic shapes to everyday objects
☆ ☐ 8. Matching shapes of the same size (congruent)
☆ ☐ 9. Counting small squares (finding the area) of a rectangle or square (thirty units or fewer)
☆ ☐ 10. Identifying the center of a circle
☆ ☐ 11. Relating six geometric solids (sphere, cone, cube, cylinder, pyramid, and rectangular solid) to everyday objects

G. ESTIMATING, GRAPHS, ETC.

☆ ☐ 1. Getting and using information from, and filling information into, simple picture graphs

LEVEL THREE MATH CHECKLIST

62 objectives, of which 51
are priority items (starred)

A. NUMBERS AND NUMERATION

☆ ☐ 1. Writing numerals from zero to 9,999
☆ ☐ 2. Identifying other ways of writing a given number up to 999
☆ ☐ 3. Identifying place value to the thousand place
☐ 4. Writing ordinal numbers from first to one hundredth, given an example
☆ ☐ 5. Writing the numeral that comes before or after a given number, between two numbers, from zero to 9,999
☆ ☐ 6. Using the symbols for greater than, less than, and equal to in writing simple expressions
☆ ☐ 7. Skip counting by 2's, 3's, 4's, 5's, 10's, and 25's to 100, by 100's to 1000, and by 1000's to 10,000
☆ ☐ 8. Identifying odd and even numbers from one to one hundred

B. COMPUTATION

☆ ☐ 1. Memorizing multiplication facts through 9 x 9
☆ ☐ 2. Memorizing division facts through 81 — 9
☆ ☐ 3. Adding numbers with up to three digits with regrouping
☆ ☐ 4. Adding two 1-, 2-, or 3-digit numbers
☆ ☐ 5. Subtracting 3-digit numbers with regrouping
☆ ☐ 6. Multiplying 3-digit numbers by 1-digit numbers with regrouping
☆ ☐ 7. Multiplying three 1-digit numbers
☆ ☐ 8. Dividing 2-digit numbers by 1-digit numbers with remainders
☆ ☐ 9. Checking for errors in computation at this level
☐ 10. Finding ten or a hundred more than or less than a given number
☆ ☐ 11. Multiplying 1- and 2-digit numbers by ten or one hundred by adding one or two zeroes
☐ 12. Applying the inverse relationship between multiplication and division
☐ 13. Writing a closed number sentence for a word problem
☐ 14. Finding the missing subtrahend in 2-digit subtraction problems with regrouping
☐ 15. Solving simple function problems, given a drawing of a function machine and a one-step rule
☆ ☐ 16. Solving word problems involving basic computation at this level

C. FRACTIONS

☆ ☐ 1. Writing fractions up to eighths for shaded parts of figures
☆ ☐ 2. Arranging unit fractions in order of size, given drawings of each fraction
☆ ☐ 3. Identifying fractions equal to one whole
☆ ☐ 4. Identifying equivalent fractions, using drawings of objects divided into halves, thirds, or quarters
☐ 5. Identifying the numerator and denominator in any common fraction
☐ 6. Identifying the meaning of a common fraction in terms of parts of a whole or of a group
☆ ☐ 7. Solving simple word problems involving fractions at this level

D. DECIMALS AND PERCENT

☆ ☐ 1. Writing numerals for dollars and cents written in words (amounts under ten dollars)
☆ ☐ 2. Computing the value of a collection of coins worth between one and two dollars, given pictures of the coins
☆ ☐ 3. Identifying the smallest number of coins needed to make an amount of money under one dollar
☆ ☐ 4. Adding and subtracting dollars and cents, amounts under ten dollars
☆ ☐ 5. Solving word problems involving computing change for purchases from a one, five, and ten dollar bill

E. MEASUREMENT

☆ ☐ 1. Telling time from a clock face reading between five-minute marks
☆ ☐ 2. Telling time from a digital clock reading
☆ ☐ 3. Identifying A.M. and P.M. as abbreviations for morning and afternoon/evening
☆ ☐ 4. Using a chart of time equivalencies with abbreviations to answer questions on equivalencies
☆ ☐ 5. Naming any month given its number in order
☆ ☐ 6. Finding a specific day or date on a calendar
☆ ☐ 7. Telling how many days there are in each month, given the verse "Thirty days has September..."
☆ ☐ 8. Using a ruler to measure a line segment whose length is exactly 1½, 2½, 3½, etc. inches long
☆ ☐ 9. Using a chart of English linear equivalencies with abbreviations to answer questions on equivalencies
☆ ☐ 10. Using a chart of English capacity measurement with abbreviations to answer questions on equivalencies
☆ ☐ 11. Using a chart of English weight measure with abbreviations to answer questions on equivalencies
☆ ☐ 12. Reading a Fahrenheit thermometer and giving the temperature with a degree sign
☆ ☐ 13. Identifying the function of a clock, watch, ruler, measuring cup, scale, thermometer, and calendar, given a list
☆ ☐ 14. Identifying the appropriate unit of measurement from a jumbled list
☆ ☐ 15. Estimating length, weight, or time

F. GEOMETRY

☆ ☐ 1. Identifying the point where two streets intersect on a map
☐ 2. Identifying a figure with a line of symmetry drawn through it, using the term symmetry
☐ 3. Distinguishing between flat (two-dimensional) and solid (three-dimensional) figures
☆ ☐ 4. Identifying basic shapes: square, rectangle, parallelogram, triangle, and circle (a list given)
☆ ☐ 5. Identifying two shapes that are similar (same shape but different size)
☆ ☐ 6. Finding the perimeter of a square or rectangle, expressed in terms of the distance around the outside
☆ ☐ 7. Finding the area of a square or rectangle with thirty or fewer units by counting squares or rows of squares
☐ 8. Distinguishing a diameter from other lines crossing a circle, without using terms
☆ ☐ 9. Identifying six geometric solids (cube, rectangular solid, cylinder, cone, sphere, and pyramid) given drawings, list

G. ESTIMATING, GRAPHS, ETC.

☆ ☐ 1. Rounding off numbers to the nearest ten or hundred
☆ ☐ 2. Reading and constructing picture or bar graphs

LEVEL FOUR MATH CHECKLIST

97 objectives, of which [illegible]
are priority items (starred)

A. NUMBERS AND NUMERATION

☆ ☐ 1. Writing numerals to the millions place
☐ 2. Using Roman numerals from one to one hundred
☆ ☐ 3. Identifying place value to the millions place
☆ ☐ 4. Sequencing whole numbers between zero and ten thousand
☆ ☐ 5. Skip counting by 2's, 3's, 4's, 5's, 10's, 100's, 1000's beginning at any number below one million
☆ ☐ 6. Identifying any number as odd or even, given a real world context
☐ 7. Identifying numbers divisible by 2, 3, 5, and 10
☐ 8. Identifying prime and composite numbers between one and thirty
☐ 9. Finding all numbers that divide evenly into a given number under one hundred (factors)

B. COMPUTATION

☆ ☐ 1. Memorizing multiplication facts through 12 x 12
☆ ☐ 2. Memorizing division facts through 144 ÷ 12
☆ ☐ 3. Adding three 4-digit numbers
☆ ☐ 4. Adding two 3- and 4-digit numbers
☆ ☐ 5. Subtracting two 4-digit numbers with regrouping
☆ ☐ 6. Subtracting a 2-digit from a 3-digit number with regrouping
☆ ☐ 7. Multiplying 3-digit numbers by 2-digit numbers, including zeroes, with regrouping
☆ ☐ 8. Multiplying a 2-digit number by a 1-digit number
☆ ☐ 9. Dividing 3-digit by 1-digit numbers with or without remainders, with 3-digit quotients
☆ ☐ 10. Dividing 4-digit by 1-digit numbers with or without remainders, with 3-digit quotients
☐ 11. Dividing 3-digit numbers by 2-digit multiples of ten with no remainders
☆ ☐ 12. Checking for errors in computation at this level
☐ 13. Identifying the sum, difference, product, and quotient as names for answers in addition, subtr, mult, and div.
☆ ☐ 14. Finding the average of three 1-digit numbers (no remainders)
☐ 15. Identifying how many times greater one multiple of ten is than another judging by the addition of a zero
☐ 16. Working out multiplication and division in parenthesis before adding or subtracting (order of operations)
☐ 17. Writing closed number sentences for a given equation
☐ 18. Supplying the missing factor in 1-digit multiplication problems
☐ 19. Solving function problems, given a drawing and a two-step rule
☆ ☐ 20. Solving one and two-step word problems involving computation at this level, some with extraneous information

C. FRACTIONS

☆ ☐ 1. Writing the common fraction for the shaded part of a figure, up to sixteenths
☆ ☐ 2. Comparing the size of two common fractions using greater than and less than symbols (denominators under 5)
☆ ☐ 3. Identifying fractions equal to one whole
☆ ☐ 4. Adding and subtracting common fractions with like denominators, no simplifying of answers
☆ ☐ 5. Renaming equivalent fractions to higher denominators
☆ ☐ 6. Identifying fractions equivalent to one half
☆ ☐ 7. Adding and subtracting two mixed numbers with like denominators, no regrouping or reducing
☆ ☐ 8. Adding a common fraction and a one-digit whole number
☆ ☐ 9. Writing mixed numbers as improper fractions
☆ ☐ 10. Writing improper fractions as mixed numbers
☐ 11. Finding one half, one third, or one quarter of a number of objects, no remainders
☐ 12. Finding the least common multiple of two numbers under ten
☐ 13. Finding the greatest common factor of two numbers under 100
☐ 14. Matching the terms numerator, denominator, mixed number, and improper fraction with examples of each
☆ ☐ 15. Solving word problems involving fractions at this level

D. DECIMALS AND PERCENT

☆ ☐ 1. Writing numerals for dollars and cents written in words, amounts under $100
☆ ☐ 2. Writing decimals and mixed decimals to the tenths place written in words, in numerals
☆ ☐ 3. Given four sets of coins, identifying which one has the most money
☆ ☐ 4. Adding and subtracting two mixed decimals to the hundredths place, written vertically
☆ ☐ 5. Writing one quarter, one half, and three quarters of a dollar in decimal form
☆ ☐ 6. Converting fractions (tenths and hundredths) to decimals
☆ ☐ 7. Solving word problems involving addition and subtraction of decimals and money at this level

E. MEASUREMENT

☆ ☐ 1. Telling what time it will be a specified number of hours and minutes hence
☆ ☐ 2. Calculating an amount of time remaining given two points in time in digital or conventional form
☆ ☐ 3. Memorizing basic equivalencies of units of time (seconds, minutes, hours, days, years, decades, and centuries)
☆ ☐ 4. Doing one-step conversions between seconds and minutes, minutes and hours, etc.
☆ ☐ 5. Memorizing the "Thirty days has.." verse and using it to tell the numbers of days in each month, and months' order
☆ ☐ 6. Using a ruler to measure a line segment to the quarter inch
☆ ☐ 7. Using a metric ruler to measure a line segment to the nearest millimeter
☆ ☐ 8. Memorizing basic equivalencies of English linear measurement (inches, feet, yards, miles)
☆ ☐ 9. Memorizing basic equivalencies of metric linear measurement (millimeters, centimeters, meters, kilometers)
☆ ☐ 10. Doing one-step conversions between inches, feet, yards, and miles
☆ ☐ 11. Memorizing basic equivalencies of English capacity measurement (cups, pints, quarts, gallons)
☆ ☐ 12. Doing one-step conversions between cups, pints, quarts, and gallons
☆ ☐ 13. Memorizing basic equivalencies of English weight (ounces, pounds, and tons)
☆ ☐ 14. Doing one-step conversions between ounces, pounds, and tons
☆ ☐ 15. Memorizing the temperature of freezing and boiling water on the Fahrenheit scale
☆ ☐ 16. Identifying the appropriate measuring instrument for an everyday task, given a list
☆ ☐ 17. Identifying the appropriate unit of measurement (including metric linear) from a jumbled list
☆ ☐ 18. Estimating length, weight, capacity, and time

(continued)

F. GEOMETRY

* ☐ 1. Identifying parallel, perpendicular, and intersecting lines on a street map
☐ 2. Identifying a right angle (marked by a square angle marker)
☐ 3. Drawing a mirror image of a figure around a line of symmetry
☐ 4. Distinguishing a rectangle from other quadrilaterals
* ☐ 5. Identifying nine two-dimensional figures (circle, square, triangle, rectangle, parallelogram, trapezoid, pentagon,
* ☐ 6. Identifying where these shapes appear in the real world, given a list /hexagon, octagon
☐ 7. Identifying shapes that are congruent, using that term
☐ 8. Identifying shapes that are similar, using that term
* ☐ 9. Finding the perimeter of a rectangle, given two dimensions, and of a square, given one dimension
* ☐ 10. Finding the perimeter of other simple polygons, given all the dimensions
* ☐ 11. Finding the area of a rectangle or square, given the formula
☐ 12. Distinguishing a diameter from other lines in and around a circle, without using terms
* ☐ 13. Recognizing seven geometric solids (cube, rectangular solid, cylinder, cone, sphere, pyramid, and triangular prism)
☐ 14. Finding the volume of a rectangular solid, given dimensions under five units and grid markings, and the formula

G. ESTIMATING, GRAPHS, ETC.

* ☐ 1. Rounding numbers off to the nearest ten, hundred, or thousand
* ☐ 2. Estimating answers to word problems by rounding off
☐ 3. Identifying simple probability
* ☐ 4. Using picture and bar graphs to answer questions and solve problems

LEVEL FIVE MATH CHECKLIST

91 objectives, of which 64
are priority items (starred)

A. NUMBERS AND NUMERATION

* ☐ 1. Writing numerals to the hundred millions place
☐ 2. Using Roman numerals from one to one thousand
* ☐ 3. Identifying place value to the hundred millions place
☐ 4. Arranging integers in order (under ten)
☐ 5. Continuing number sequences in which each step doubles the previous one
☐ 6. Identifying numbers divisible by 2, 3, 4, 5, and 10
☐ 7. Identifying prime and composite numbers between one and fifty
☐ 8. Identifying the prime factors of numbers between one and fifty

B. COMPUTATION

* ☐ 1. Adding columns of four 4-digit numbers or three 5-digit numbers
* ☐ 2. Adding three numbers with different numbers of digits, written vertically or horizontally
* ☐ 3. Subtracting numbers with up to six digits, written vertically or horizontally
* ☐ 4. Multiplying 4-digit multiplicands by 1-digit multipliers and 3-digit multiplicands by 2-digit multipliers
* ☐ 5. Dividing 4-digit numbers with a zero by 1-digit divisors with remainders
* ☐ 6. Dividing 3-digit numbers by 2-digit numbers with remainders
* ☐ 7. Checking for errors in computation at this level
☐ 8. Identifying twelve mathematical terms, given a list of the terms (addend, sum, difference, etc.)
* ☐ 9. Finding the average of a set of 2-digit numbers (no remainders)
☐ 10. Identifying how much greater one multiple of ten or one hundred is than another judging by zeroes
☐ 11. Working out multiplication and division in parenthesis before adding or subtracting (order of operations)
☐ 12. Writing the open number sentence for word problems involving basic operations with one step
☐ 13. Using empty boxes or letters as place holders in open number sentences
☐ 14. Solving function problems, given a drawing and a two-step rule and less explicit explanation than level four
* ☐ 15. Finding the missing information needed to solve a word problem that has insufficient information
* ☐ 16. Solving one and two-step word problems involving computation at this level, some containing extraneous inf.

C. FRACTIONS

* ☐ 1. Circling one half, one third, one fourth, one fifth, or one eighth of a row of objects
* ☐ 2. Shading in a fractional part of a whole unit
☐ 3. Arranging fractions with denominators under ten in ascending or descending order
☐ 4. Finding the fraction which when added to a given fraction makes one whole
* ☐ 5. Adding and subtracting common fractions with unlike denominators, answers in simplest terms
* ☐ 6. Identifying fractions equivalent to one half, one third, one fourth, or one fifth
* ☐ 7. Simplifying common fractions with denominators less than fifty
* ☐ 8. Adding and subtracting mixed numbers with like denominators, no regrouping
* ☐ 9. Subtracting a common fraction from a one-digit whole number
* ☐ 10. Multiplying common fractions with cancellation, the word "of" substituted for the times sign in some problems
* ☐ 11. Multiplying a common fraction and a whole number, the word "of" substituted for the times sign in some problems
* ☐ 12. Multiplying a mixed number by a common fraction
* ☐ 13. Dividing common fractions
* ☐ 14. Dividing fractions by whole numbers and vice-versa
☐ 15. Finding the reciprocal of a common fraction
☐ 16. Identifying numerator, denominator, mixed fractions, and improper fractions without a list
* ☐ 17. Solving simple proportion problems in fraction and ratio form
* ☐ 18. Solving one and two-step word problems involving fractions at this level

D. DECIMALS AND PERCENT

* ☐ 1. Writing mixed decimals to the thousandths place written in words, as numerals
* ☐ 2. Identifying decimal place value to the thousandths place
* ☐ 3. Using greater than and less than signs to compare decimals to the thousandths place
☐ 4. Identifying equivalent decimals when some have redundant zeroes to the right of the last digit
* ☐ 5. Adding and subtracting decimals and mixed decimals to the thousandths place, with unequal numbers of decimals
* ☐ 6. Multiplying simple decimals and mixed decimals with 1-digit multipliers and 2-digit multiplicands
* ☐ 7. Dividing decimals and mixed decimals of two digits by 1-digit divisors with no remainders
* ☐ 8. Writing mixed fractions with tenths and hundredths as mixed decimals
* ☐ 9. Applying the complementarity of percents to 100%
* ☐ 10. Solving one and two-step word problems involving decimals and money at this level

E. MEASUREMENT

* ☐ 1. Calculating elapsed time given two points in time in digital or conventional readings
* ☐ 2. Adding and subtracting units of time with regrouping (seconds, minutes, etc.)
* ☐ 3. Telling the number of days in each month and the order of months
* ☐ 4. Using a ruler to measure a line segment to a sixteenth of an inch
* ☐ 5. Using a metric ruler to measure a line segment to the nearest millimeter
* ☐ 6. Adding and subtracting English linear measurements with regrouping
* ☐ 7. Adding and subtracting metric linear measurements with regrouping
* ☐ 8. Adding and subtracting English units of capacity with regrouping
* ☐ 9. Memorizing basic equivalencies of metric capacity measurement and using them to do one-step conversions
* ☐ 10. Adding and subtracting English units of weight with regrouping
* ☐ 11. Memorizing basic equivalencies of metric weight and using them to do one-step conversions
* ☐ 12. Applying knowledge of the boiling and freezing points of water and of normal body temperature (°F)
* ☐ 13. Memorizing the boiling and freezing points of water on the Celsius scale
* ☐ 14. Identifying the appropriate measuring instrument for a task, given a list
* ☐ 15. Identifying the appropriate unit of measurement, English or metric, from a list separated by English/metric
* ☐ 16. Estimating length, weight, capacity, and time

(continued)

LEVEL FIVE CHECKLIST, PAGE TWO

F. GEOMETRY

☆ ☐ 1. Identifying terms dealing with lines, given a map or isolated drawings (line segment, point, etc.)
☐ 2. Identifying right, acute, and obtuse angles, given drawings and a list
☐ 3. Identifying the terms ray, vertex, and angle in a drawing
☐ 4. Drawing a mirror image of a figure around a line of symmetry
☐ 5. Classifying shapes by whether they are two or three-dimensional
☆ ☐ 6. Identifying ten two-dimensional figures (circle, square, triangle, etc.)
☆ ☐ 7. Identifying where these shapes appear in the real world
☐ 8. Identifying shapes that are congruent
☐ 9. Identifying shapes that are similar
☐ 10. Identifying an equilateral triangle
☆ ☐ 11. Finding the perimeter of polygons
☆ ☐ 12. Finding the area of a rectangle or square, given the formula
☆ ☐ 13. Finding the area of a right triangle, given the formula, answers in square units
☆ ☐ 14. Identifying the diameter of a circle
☆ ☐ 15. Identifying seven geometric solids, given drawings (cube, rectangular solid, etc.)
☐ 16. Finding the volume of a rectangular solid, given the formula

G. ESTIMATING, GRAPHS, ETC.

☆ ☐ 1. Rounding whole numbers off to the nearest ten, hundred, thousand or ten thousand
☆ ☐ 2. Rounding off mixed decimals to the nearest whole number
☆ ☐ 3. Estimating answers to word problems by rounding off
☐ 4. Identifying simple probability
☆ ☐ 5. Using picture, bar, and line graphs to answer questions and solve simple problems
☐ 6. Locating coordinates on a line graph
☆ ☐ 7. Getting distance information from a map by using the scale

LEVEL SIX MATH CHECKLIST

102 objectives, of which 69
are priority items (starred).

A. NUMBERS AND NUMERATION

☆ ☐ 1. Writing numerals to the billions place
☐ 2. Using Roman numerals to two thousand
☆ ☐ 3. Identifying place value to the billions place
☐ 4. Writing numbers up to billions in expanded notation
☆ ☐ 5. Arranging integers in order (under twenty)
☐ 6. Identifying opposite integers
☐ 7. Continuing a number sequence that rises in arithmetic or geometric steps
☆ ☐ 8. Identifying numbers divisible by 2, 3, 4, 5, 9, and 10, and odd and even numbers
☐ 9. Identifying prime numbers between one and one hundred
☐ 10. Writing numbers up to one hundred in prime factored form
☆ ☐ 11. Writing exponents in words and vice-versa

B. COMPUTATION

☆ ☐ 1. Adding numbers with up to six digits
☆ ☐ 2. Subtracting numbers with up to seven digits
☆ ☐ 3. Multiplying 4-digit numbers by 3-digit numbers
☆ ☐ 4. Dividing 4-digit numbers by 2-digit numbers, with or without remainders
☆ ☐ 5. Checking for errors in computation at this level
☐ 6. Identifying twelve mathematical terms, given a list (product, addend, etc.)
☆ ☐ 7. Finding the average of a set of 2-digit numbers, no remainders, presented in a word problem
☐ 8. Identifying how many times greater one multiple of 10, 100, or 1000 is than another
☐ 9. Working out multiplication and division in parenthesis before adding or subtracting
☆ ☐ 10. Solving computations with two exponents to the power to two, three, or four
☐ 11. Adding and subtracting 1-digit integers
☐ 12. Writing open number sentences for word sentences involving one operation
☐ 13. Using letters as place holders in simple open number sentences
☐ 14. Evaluating a simple expression with one variable, given the value of the variable
☐ 15. Deducing the one-step rule of a function machine, given input and output information
☆ ☐ 16. Finding the missing information needed to solve a word problem that has insufficient information
☆ ☐ 17. Solving one and two-step word problems involving computation at this level, some including extraneous inf.

C. FRACTIONS

☆ ☐ 1. Filling in one half, one third, or one fourth of a figure divided into units that are a multiple of the fraction
☆ ☐ 2. Circling one half, one third, two thirds, one fourth, three fourths, or one eighth of a row of objects
☐ 3. Arranging fractions with denominators of twelve and under in order of size
☐ 4. Finding the fraction which when added to a given fraction makes one whole
☆ ☐ 5. Adding and subtracting common fractions with unlike denominators
☆ ☐ 6. Finding a fractional part of a large number, expressed in lowest terms, in word problem form
☆ ☐ 7. Adding mixed numbers with like denominators with regrouping
☆ ☐ 8. Subtracting mixed numbers with like denominators with regrouping
☆ ☐ 9. Adding and subtracting mixed numbers with unlike denominators, no regrouping
☆ ☐ 10. Multiplying two or three common fractions, mixed fractions, or whole numbers, including money
☆ ☐ 11. Dividing common fractions, mixed fractions, or whole numbers, answers in simplest terms
☐ 12. Identifying numerator, denominator, reciprocal, mixed and improper fraction, no list
☆ ☐ 13. Solving ratio and proportion problems in practical situations
☐ 14. Solving ratio and proportion problems in fraction and ratio form
☆ ☐ 15. Solving one and two-step word problems involving fractions at this level

D. DECIMALS AND PERCENT

☆ ☐ 1. Writing mixed decimals to the ten thousandths place - written as words - as numerals
☆ ☐ 2. Identifying decimal place value to the ten thousandths place
☆ ☐ 3. Arranging decimals in order of size
☐ 4. Identifying equivalent decimals when some have redundant zeroes to the right of the last digit
☆ ☐ 5. Writing a number containing millions and hundred thousands in abbreviated decimal notation
☆ ☐ 6. Adding and subtracting decimals and mixed decimals with different numbers of decimal places
☆ ☐ 7. Multiplying decimals, mixed decimals, and whole numbers with up to 2-digit multipliers
☆ ☐ 8. Dividing decimals, mixed decimals, and whole numbers with 1-digit divisors, without remainders
☆ ☐ 9. Writing fractions and mixed numbers with denominators of 10, 100, 1000, and 10,000 as decimals and mixed decimals
☆ ☐ 10. Changing common fractions with terminating decimals to decimals
☐ 11. Identifying simple fractions that have repeating or recurring decimals when converted to decimals
☆ ☐ 12. Changing decimals to the hundredths place to percents
☐ 13. Changing a whole-number percent of two digits to its decimal equivalent
☆ ☐ 14. Changing common fractions to percents (only terminating decimals)
☐ 15. Changing the percents for common fractions to fractions
☐ 16. Telling what percent of a figure is shaded, given a common fraction shaded
☆ ☐ 17. Finding the percent of a whole number (only whole number percents)
☆ ☐ 18. Solving one and two-step word problems involving decimals and percents at this level

(continued)

E. MEASUREMENT

☆ ☐ 1. Calculating the elapsed time given two points in time - in digital or conventional readings
☆ ☐ 2. Renaming "improper" measures of time (e.g. 25 hours) with two measures
☆ ☐ 3. Telling the number of days in each month
☆ ☐ 4. Interpreting and writing dates in numeral form
☆ ☐ 5. Using an English and metric ruler to measure a line segment
☆ ☐ 6. Renaming "improper" English and metric linear measures with two measures
☆ ☐ 7. Renaming "improper" English and metric capacity measures with two measures
☆ ☐ 8. Renaming "improper" English and metric weight measures with two measures
☆ ☐ 9. Applying knowledge of the boiling and freezing points of water and of normal body temperature (°F) in wd. probs.
☆ ☐ 10. Knowing an approximate Celsius temperature reading for common temperatures
☆ ☐ 11. Identifying the appropriate measuring instrument for a task
☆ ☐ 12. Identifying the appropriate units of measurement, English or metric, from a list separated by English and metric
☆ ☐ 13. Estimating length, weight, capacity, and time

F. GEOMETRY

☆ ☐ 1. Identifying terms dealing with lines given a map or isolated drawings
☐ 2. Identifying right, acute, and obtuse angles, given drawings and a list
☐ 3. Identifying the terms ray, vertex, and angle in a drawing
☐ 4. Identifying a figure with two lines of symmetry drawn through it
☐ 5. Classifying shapes by whether they are one, two, or three-dimensional
☆ ☐ 6. Identifying ten two-dimensional figures (circle, square, etc.)
☆ ☐ 7. Identifying where these shapes appear in the real world
☐ 8. Identifying equal sides and angles in congruent figures
☐ 9. Identifying corresponding sides and equal angles in similar triangles
☐ 10. Identifying isosceles, equilateral, and scalene triangles
☆ ☐ 11. Finding the perimeter of a square, rectangle, or triangle in a word problem
☆ ☐ 12. Finding the area of a rectangle or a square in a word problem, given the formula
☆ ☐ 13. Finding the area of any triangle or a parallelogram, given the formula
☆ ☐ 14. Identifying center, diameter, radius, chord, and circumference of a circle
☐ 15. Finding the circumference of a circle, given the formula and the value of pi
☆ ☐ 16. Identifying seven geometric solids and everyday objects that have that shape (cube, sphere, etc.)
☐ 17. Finding the surface area of a cube or rectangular solid, formula given
☆ ☐ 18. Finding the volume of a rectangular solid or cube, given the formula

G. ESTIMATING, GRAPHS, ETC.

☆ ☐ 1. Rounding whole numbers off to any place up to hundred thousands
☆ ☐ 2. Rounding off decimals and mixed decimals to the nearest whole number, tenth, or hundredth, money to nearest cent
☆ ☐ 3. Estimating answers to word problems by rounding off, including area and volume problems
☆ ☐ 4. Identifying probability in word problems
☆ ☐ 5. Using picture, bar, line, and circle graphs to answer questions and solve problems
☐ 6. Graphing ordered pairs
☆ ☐ 7. Identifying the median of a set of data
☆ ☐ 8. Getting information from a table or schedule
☆ ☐ 9. Getting distance information from a map by using the scale
☆ ☐ 10. Getting information from a scale drawing

LEVEL SEVEN MATH CHECKLIST

108 objectives, of which 70
are priority items (starred)

A. NUMBERS AND NUMERATION

★ ☐ 1. Writing numerals to the hundred trillions place
☐ 2. Using Roman numerals to two thousand
★ ☐ 3. Identifying place value to the trillions place
☐ 4. Identifying a ten-digit number from its expanded exponential notation
★ ☐ 5. Arranging any integers in order
☐ 6. Identifying opposite integers
☐ 7. Continuing a number sequence that rises in arithmetic or geometric steps
★ ☐ 8. Identifying numbers divisible by 2, 3, 4, 5, 9, and 10, and odd and even numbers
☐ 9. Identifying prime numbers up to one hundred
☐ 10. Expressing a number up to one hundred as a product of prime factors, using exponential notation when necessary
★ ☐ 11. Expressing exponents in words and vice-versa
★ ☐ 12. Writing products of ten as exponential powers of ten
☐ 13. Finding the square root of perfect squares
☐ 14. Estimating the square root of a non-perfect-square number under one hundred, to the nearest tenth

B. COMPUTATION

★ ☐ 1. Adding numbers with up to seven digits
★ ☐ 2. Subtracting numbers with up to eight digits
★ ☐ 3. Multiplying 5-digit by 3-digit numbers
★ ☐ 4. Dividing 5-digit by 3-digit numbers, with remainders, quotients expressed as mixed numbers
★ ☐ 5. Checking for errors in computation at this level
☐ 6. Using the twelve terms for different parts of computation problems without benefit of a list
★ ☐ 7. Finding the average of whole numbers and decimals presented in word problem form, rounding off
☐ 8. Identifying how many times greater one multiple of 10, 100, or 1000 is than another
☐ 9. Knowing the order of operations in expressions written without parenthesis
★ ☐ 10. Solving problems with two or three exponents up to the fifth power
☐ 11. Adding and subtracting 1-digit integers
☐ 12. Writing open number sentences for word sentences involving one operation
☐ 13. Solving a simple equation with one variable and one operation
☐ 14. Finding the value of an open phrase with two variables, given the value of the variables
☐ 15. Deducing the two-step rule of a function machine, given input and output information
★ ☐ 16. Identifying the missing information needed to solve a word problem that has insufficient information
★ ☐ 17. Solving one, two, or three-step word problems involving computation at this level, some with extraneous inf.

C. FRACTIONS

★ ☐ 1. Writing the common fraction reduced to the lowest terms that is shaded in a drawing
★ ☐ 2. Circling a fraction of a row of objects
☐ 3. Arranging fractions in order of size
☐ 4. Finding the fraction half way between two fractions
☐ 5. Finding the fraction which when added to a given fraction makes one whole
★ ☐ 6. Finding a fractional part of a large number, expressed in lowest terms, in word problem form
★ ☐ 7. Adding two or three mixed numbers with unlike denominators with regrouping
★ ☐ 8. Subtracting mixed numbers with unlike denominators with regrouping
★ ☐ 9. Multiplying two or three common fractions, mixed numbers, or whole numbers, including finding a fraction of money
★ ☐ 10. Dividing common fractions, mixed numbers, or whole numbers
☐ 11. Identifying numerator, denominator, reciprocal, mixed numbers, and improper fractions without a list
★ ☐ 12. Solving ratio and proportion problems in practical situations
☐ 13. Solving ratio and proportion problems in fraction and ratio form
★ ☐ 14. Solving one and two-step problems involving fractions at this level

D. DECIMALS AND PERCENT

★ ☐ 1. Writing mixed decimals to the millionth place as numerals
★ ☐ 2. Identifying decimal place value to the millionths place
★ ☐ 3. Arranging decimals in order of size
☐ 4. Identifying equivalent decimals when some have redundant zeroes to the right of the last digit
★ ☐ 5. Writing a number containing billions and hundred millions in abbreviated decimal notation
★ ☐ 6. Adding and subtracting decimals and mixed decimals with different numbers of decimal places
★ ☐ 7. Multiplying decimals, mixed decimals, and whole numbers, some problems needing one or more zeroes to left of prod.
★ ☐ 8. Dividing decimals, mixed decimals, and whole numbers with 2-digit divisors, some with additional zeroes required
★ ☐ 9. Dividing by ten, one hundred, or one thousand by moving the decimal point
★ ☐ 10. Writing fractions and mixed fractions with denominators of ten, one hundred, one thousand..as decimals
★ ☐ 11. Changing any common fraction to a decimal (to a given number of decimal places)
★ ☐ 12. Changing decimals to the thousandths place and mixed decimals to percents
☐ 13. Changing percents with one decimal place and percents over one hundred to decimals and mixed decimals
★ ☐ 14. Changing common fractions with terminating and recurring decimals to percents
★ ☐ 15. Memorizing the percent equivalencies of frequently-used fractions
★ ☐ 16. Finding the percent of a whole number or mixed decimal when the percent is a mixed decimal or more than 100
☐ 17. Finding what percent one number is of another (percents under one hundred) expressed in word problems
☐ 18. Finding a number when the percent of it is known (percents under one hundred)
★ ☐ 19. Solving one and two-step word problems involving decimals and percents at this level

(continued)

LEVEL SEVEN CHECKLIST, PAGE TWO

E. MEASUREMENT

- ☆ ☐ 1. Calculating elapsed time given two points in time in digital or conventional readings
- ☆ ☐ 2. Doing two-step conversions between units of time
- ☆ ☐ 3. Telling the number of days in each month
- ☆ ☐ 4. Interpreting and writing dates in numerical form
- ☆ ☐ 5. Using an English and metric ruler to measure a line segment
- ☆ ☐ 6. Doing two-step conversions within English linear measures and within metric linear measures
- ☆ ☐ 7. Doing two-step conversions within English capacity measures and within metric capacity measures
- ☆ ☐ 8. Doing two-step conversions within English measures of weight and within metric measures of weight
- ☆ ☐ 9. Applying knowledge of the boiling and freezing points of water and of normal body temperature (°F) in word probs.
- ☆ ☐ 10. Knowing an approximate Celsius temperature reading for common temperatures
- ☆ ☐ 11. Identifying the appropriate measuring instrument for a task, given a list
- ☆ ☐ 12. Identifying the appropriate unit of measurement, English or metric, from a list
- ☆ ☐ 13. Estimating length, weight, capacity, and time

F. GEOMETRY

- ☆ ☐ 1. Identifying terms dealing with lines given a map or isolated drawings
- ☐ 2. Identifying right, acute, obtuse, and reflex angles, given a list
- ☆ ☐ 3. Identifying a ray, vertex, angle, and bisector of an angle
- ☐ 4. Identifying a figure with two or more lines of symmetry drawn through it
- ☐ 5. Finding vertical and supplementary angles
- ☐ 6. Finding a missing angle in a triangle and a quadrilateral, given the other angles
- ☐ 7. Distinguishing the differences and overlaps among the terms quadrilateral, square, rectangle, parallelogram, and trapezoid
- ☆ ☐ 8. Identifying polygons with up to twelve sides
- ☆ ☐ 9. Identifying where these shapes appear in the real world
- ☐ 10. Identifying the equal sides and angles in congruent figures
- ☐ 11. Identifying corresponding sides and equal angles in similar polygons
- ☐ 12. Identifying the characteristics of an isosceles, scalene, and equilateral triangle
- ☆ ☐ 13. Finding the perimeter of any figure, given a word problem
- ☆ ☐ 14. Finding the area of a rectangle or a square in a word problem, given the formula
- ☆ ☐ 15. Finding the area of any triangle, parallelogram, or trapezoid, given the formula
- ☆ ☐ 16. Identifying center, diameter, radius, chord, arc, circumference, and tangent of a circle
- ☐ 17. Finding the circumference of a circle, given the formula and the value of pi
- ☐ 18. Finding the area of a circle, given the formula and the value of pi
- ☆ ☐ 19. Identifying seven geometric solids and everyday objects that have that shape
- ☐ 20. Finding the surface area of solid figures, given the formula
- ☆ ☐ 21. Finding the volume of a rectangular solid or cube in a word problem, given the formula

F. ESTIMATING, GRAPHS, ETC.

- ☆ ☐ 1. Rounding whole numbers off to any place up to billions
- ☆ ☐ 2. Rounding off decimals or mixed decimals to any place to the thousandths
- ☆ ☐ 3. Estimating answers to word problems by rounding off, including area and volume problems
- ☆ ☐ 4. Identifying probability in word problems
- ☐ 5. Working with set terminology: union and intersection, nul and empty, finite and infinite, etc.
- ☆ ☐ 6. Using picture, bar, line, and circle graphs with multiples on one coordinate to answer questions, solve problems
- ☐ 7. Plotting points on a Cartesian plane
- ☆ ☐ 8. Identifying the median of a set of data
- ☆ ☐ 9. Getting information from a table or schedule
- ☆ ☐ 10. Getting distance information from a map or scale drawing

LEVEL EIGHT MATH CHECKLIST

118 objectives, of which 69
are priority items (starred)

A. NUMBERS AND NUMERATION

* ☐ 1. Writing numerals to the hundred trillions place
☐ 2. Using Roman numerals to two thousand
* ☐ 3. Identifying place value to the trillions place
☐ 4. Writing numbers in scientific notation and vice-versa
* ☐ 5. Arranging any integers in order
☐ 6. Giving the absolute value of a number
☐ 7. Continuing a number sequence that rises in arithmetic or geometric steps
* ☐ 8. Identifying numbers divisible by 2, 3, 4, 5, 9, and 10, and odd and even numbers
☐ 9. Identifying prime numbers up to five hundred
☐ 10. Expressing a number up to 200 as a product of prime factors using exponential notation
* ☐ 11. Expressing exponents in words and vice-versa
* ☐ 12. Writing products of ten as exponential powers of ten
☐ 13. Estimating the square root of non-perfect-square numbers under five hundred, rounded to the nearest tenth

B. COMPUTATION

* ☐ 1. Adding numbers with up to seven digits
* ☐ 2. Subtracting numbers with up to eight digits
* ☐ 3. Multiplying 5-digit by 3-digit numbers
* ☐ 4. Dividing 5-digit by 3-digit numbers with remainders, quotients as mixed fractions
* ☐ 5. Checking for errors in computation at this level
☐ 6. Using the twelve terms for different parts of computation problems without a list
☐ 7. Identifying integers and whole, rational, irrational, and real numbers
* ☐ 8. Finding the average of a set of 3-digit whole numbers, decimals, or mixed decimals, presented in word problems
☐ 9. Identifying how many times greater one multiple of 10, 100, or 1000 is than another
☐ 10. Applying the order of operations in expressions written without parentheses
* ☐ 11. Solving exponent problems with three or more parts and higher powers
☐ 12. Finding the product in exponential form of two or more positive integral powers with the same base
☐ 13. Finding the product in exponential form of two or more positive and negative integral powers with the same base
☐ 14. Finding the quotient in exponential form of a positive and negative integral power with the same base
☐ 15. Adding, subtracting, multiplying, and dividing integers
☐ 16. Translating a word phrase to a literal expression
☐ 17. Solving an equation with one variable and two operations
☐ 18. Finding the value of an open phrase with two variables, given the value of the variables
☐ 19. Deducing the two-step rule of a function machine and using the rule to determine further output
* ☐ 20. Identifying the missing information needed to solve a word problem that has insufficient information
* ☐ 21. Solving one, two, and three-step word problems involving computation at this level, some with extraneous inf.

C. FRACTIONS

* ☐ 1. Finding what fractional part one number is of another
☐ 2. Arranging fractions in order of size
☐ 3. Finding the fraction half way between two fractions
☐ 4. Finding the fraction which when added to a given fraction makes one whole
* ☐ 5. Finding a fractional part of a large number, expressed in lowest terms, in word problem form
* ☐ 6. Adding two or three mixed fractions with unlike denominators with regrouping
* ☐ 7. Subtracting mixed fractions with unlike denominators with regrouping
* ☐ 8. Multiplying two or three common fractions, mixed fractions, or whole numbers, including finding a fraction of
* ☐ 9. Dividing common fractions, mixed fractions, or whole numbers money
☐ 10. Identifying numerator, denominator, reciprocal, mixed fraction, and improper fraction without a list
* ☐ 11. Solving ratio and proportion problems in practical situations
☐ 12. Solving ratio and proportion problems with fractions and mixed numbers
* ☐ 13. Finding a number when a fractional part of it is known
* ☐ 14. Solving one, two, and three-step word problems involving fractions at this level

D. DECIMALS AND PERCENT

* ☐ 1. Writing mixed decimals to the ten millionths place
* ☐ 2. Identifying decimal place value to the ten millionths place
☐ 3. Writing decimals in expanded form
☐ 4. Writing mixed decimals in expanded form using exponential notation
* ☐ 5. Arranging decimals in order of size
☐ 6. Identifying equivalent decimals when some have redundant zeroes to the right of the last digit
* ☐ 7. Writing a number containing billions and hundred millions in abbreviated decimal notation
* ☐ 8. Adding and subtracting decimals and mixed decimals with different numbers of decimal places
* ☐ 9. Multiplying decimals, mixed decimals, and whole numbers, some problems needing one or more zeroes to the left of
* ☐ 10. Dividing decimals, mixed decimals, and whole numbers with 3-digit divisors, some needing zeroes /the product
* ☐ 11. Dividing by a power of ten by moving the decimal point
* ☐ 12. Changing any common or mixed fraction to a decimal, rounded to a specified number of decimal places
* ☐ 13. Changing any decimal or mixed decimal to a percent
☐ 14. Changing any percent to a decimal
* ☐ 15. Changing any fraction to a percent
* ☐ 16. Finding the percent of a whole number or mixed decimal when the percent is a mixed decimal or more than 100
* ☐ 17. Finding what decimal part one number is of another
☐ 18. Finding what percent one number is of another, including percents over 100
☐ 19. Finding a number when decimal part of it is known
☐ 20. Finding a number when the percent is known, including percents over 100
* ☐ 21. Solving one, two, and three-step word problems involving decimals and percents at this level

(continued)

E. MEASUREMENT

☆ ☐ 1. Calculating elapsed time given two points in time in digital or conventional readings
☆ ☐ 2. Adding and subtracting three-part measures of time with regrouping
☆ ☐ 3. Telling the number of days in each month
☆ ☐ 4. Interpreting and writing dates in numerical form
☆ ☐ 5. Using an English and metric ruler to measure a line segment
☆ ☐ 6. Adding and subtracting three-part linear measurements within the English and metric systems, with regrouping
☆ ☐ 7. Adding and subtracting three-part capacity measurements within the English and metric systems, with regrouping
☆ ☐ 8. Adding and subtracting three-part weight measurements within the English and metric systems, with regrouping
☆ ☐ 9. Applying knowledge of the boiling and freezing points of water and of normal body temperature (°F) for word probs.
☆ ☐ 10. Knowing the approximate Celsius temperature for common temperatures
☆ ☐ 11. Identifying the appropriate measuring instrument for a task, given a list
☆ ☐ 12. Identifying the appropriate unit of measurement, English or metric, from a list separated by English and metric
☐ 13. Converting between English and metric measurements, given a formula
☆ ☐ 14. Estimating length, weight, capacity, and time

F. GEOMETRY

☆ ☐ 1. Identifying terms dealing with lines and angles on a map or in isolated drawings
☐ 2. Identifying right, acute, obtuse, and reflex angles
☐ 3. Identifying a ray, vertex, angle, and bisector of an angle
☐ 4. Identifying a figure that can have one or more lines of symmetry drawn through it
☐ 5. Finding vertical, supplementary, complementary, and reflex angles
☐ 6. Finding a missing angle in a triangle or quadrilateral, or a missing interior angle in a circle
☐ 7. Naming different quadrilaterals from a description
☆ ☐ 8. Identifying polygons with up to twelve sides
☆ ☐ 9. Identifying where these shapes appear in the real world
☐ 10. Matching sides and angles of similar and congruent figures
☐ 11. Using ratios to find the missing dimensions of similar triangles
☐ 12. Finding two missing angles in an isosceles triangle by applying the fact that base angles are equal
☆ ☐ 13. Identifying the hypotenuse of a right triangle
☆ ☐ 14. Finding the perimeter of any figure, given a word problem
☐ 15. Finding the other dimension of a rectangle, given one dimension and the perimeter
☆ ☐ 16. Finding the area of a rectangle or a square in a word problem, given the formula
☆ ☐ 17. Finding the area of any triangle, parallelogram, or trapezoid, given the formula
☐ 18. Finding the other dimension of a rectangle, given one dimension and its area
☆ ☐ 19. Identifying center, diameter, radius, chord, tangent, arc, secant, semicircle, and circumference of a circle
☐ 20. Finding the circumference of a circle, given the formula and the value of pi
☐ 21. Finding the area of a circle, given the formula and the value of pi
☆ ☐ 22. Identifying where geometric solids appear in everyday life
☐ 23. Finding the surface area of solid figures, given the formula
☆ ☐ 24. Finding the volume of a rectangular solid or cube in a word problem, given the formula
☐ 25. Finding the volume of other geometric solids, given the formula

G. ESTIMATING, GRAPHS, ETC.

☆ ☐ 1. Rouding whole numbers to any place up to hundred trillions
☆ ☐ 2. Rounding decimals to any place to thousandths
☆ ☐ 3. Estimating answers to word problems by rounding off, including area and volume problems
☆ ☐ 4. Identifying probability in word problems
☐ 5. Finding the intersection, union, and complement of sets, recognizing disjoint sets
☆ ☐ 6. Using picture, bar, line, and circle graphs with multiples on one coordinate to answer questions, solve problems
☐ 7. Plotting points on a Cartesian plane
☆ ☐ 8. Identifying the median of a set of data
☆ ☐ 9. Getting information from a table or schedule
☆ ☐ 10. Getting distance information from a map or scale drawing

CORRELATION WITH STATE BASIC SKILLS

The Massachusetts Basic Skills Improvement Policy of 1979 leaves broad discretion to local school systems in setting objectives and devising tests and cut-off scores. However, the policy does require a specific set of minimum objectives in mathematics and language arts at the secondary level. Below is a comprehensive list of the state math objectives cross-referenced with the objectives of this curriculum at levels six, seven, and eight. All objectives leading to state-required objectives are circled.

STATE SECONDARY BASIC SKILLS	Level Six Objectives	Level Seven Objectives	Level Eight Objectives
(a)1. Recognize number symbols	A-1	A-1	A-1
whole numbers	A-1	A-1	A-1
fractions	C-1, C-2	C-1, C-2	C-1
decimals	D-1, D-2	D-1, D-2	D-1, D-2
and powers of 10	A-11	A-11, 12	A-11, 12
2. Identify odd and even numbers	A-8	A-8	A-8
3. Put numbers in numerical order	A-5	A-5	A-5
4. Recognize equivalent fractions	C-6	C-6	C-5
(b)1. Add whole numbers	B-1	B-1	B-1
Subtract whole numbers	B-2	B-2	B-2
Multiply whole numbers	B-3	B-3	B-3
Divide whole numbers	B-4	B-4	B-4
2. Add and subtract mixed numbers	C-7,8,9	C-7,8	C-6,7
3. Multiply whole numbers by fractions	C-10	C-9	C-8
Multiply money by fractions	C-10	C-9	C-8
4. Add decimal numbers like money	D-6	D-6	D-8
Subtract decimal numbers like money	D-6	D-6	D-8
Multiply decimal numbers like money	D-7	D-7	D-9
Divide decimal numbers like money	D-8	D-8	D-10
5. Change a fraction to a decimal	D-10	D-11	D-12
6. Find a percent of a number in situations such as simple interest, discounts, commissions, and taxes	D-17,18	D-16,19	D-16,21
7. Use ratio and proportion	C-14	C-12	C-11
8. Use simple formulas (A=l x w)	F-12	F-14	F-16
(c)1. Round off numbers to a specified pl.	G-1,2	G-1,2	G-1,2
2. Approximate answer to a computation problem (incl. discounts & percent)	G-3	G-3	G-3

STATE SECONDARY BASIC SKILLS	Level Six Objectives	Level Seven Objectives	Level Eight Objectives
(c)3. Estimate length, weight/mass, capacity	E-13	E-13	E-14
Estimate time	E-13	E-13	E-14
Estimate temperature	E-10	E-10	E-10
Estimate area	G-3	G-3	G-3
Estimate volume	G-3	G-3	G-3
4. Estimate with money	G-3	G-3	G-3
(d)1. Choose an appropriate unit of measurement in U.S. Customary system	E-12	E-12	E-12
2. Choose an appropriate unit of measurement in the metric system	E-12	E-12	E-12
3. Choose an appropriate measurement instrument involving both U.S. customary and metric units	E-11	E-11	E-11
4. Convert common measurements within the same system	E-2,6,7,8	E-2,6,7,8	E-2,6,7,8
5. Read a scale drawing	G-10	G-10	G-10
6. Use a map to compute highway distances	G-9	G-10	G-10
7. Relate total cost and cost per unit	D-17	D-19	D-21
8. Compute by using temperature	E-9	E-9	E-9
9. Compute by using time	E-1	E-1	E-1
10. Identify right angles and parallel, perpendicular, and intersecting lines like those on a street map	F-1	F-1	F-1
11. Recognize that an object has the shape of a square, rectangle, triangle, or parallelogram	F-6,7	F-8,9	F-8,9
12. Identify the radius, diameter, and center of a circle	F-14	F-16	F-19
13. Recognize that an object has the shape of a cube, cylinder, or sphere	F-16	F-19	F-22
14. Find the perimeter of a triangle, square, and rectangle	F-11	F-13	F-14
15. Find the area of a triangle, square, and rectangle	F-12,13	F-14,15	F-16,17
16. Find the volume of a cube or other rectangular solid	F-18	F-21	F-24
(e)1. Read a table	G-8	G-9	G-9
2. Interpret a bar graph	G-5	G-6	G-6
3. Interpret a circle graph	G-5	G-6	G-6
4. Interpret a line graph	G-5	G-6	G-6

STATE SECONDARY BASIC SKILLS	Level Six Objectives	Level Seven Objectives	Level Eight Objectives
(f)1. Understanding probabilities like those used in weather forecasting or lotteries (the chance something will or will not happen)	G-4	G-4	G-4
2. Find and use averages (mean and median) for a group of numbers	B-7, G-7	B-7, G-8	B-8, G-8

NOTES

ACKNOWLEDGEMENTS

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In addition to these sources, close to 1,000 Boston elementary and middle school teachers reviewed the penultimate draft and made numerous helpful comments. The following individuals reviewed earlier drafts and provided invaluable critiques: Harold Abelson, Kitty Boles, Barney Brawer, James Breeden, Ken Caldwell, Gregory Coffin, Barbara Corey, Tom Deveney, Michael Fung, Ellen Guiney, Robert Hayden, Mary Iatridis, Peter Ingeneri, Roy Kaplow, Peggy McNeil, Anne Madden, Steve Marcus, Liz Miller, Fred Paul, Maurene Roach, Tom Roach, Nick Rubino, Louise Scanlon-Oberg, Rhoda Schneider, Judah Schwartz, Jackie Scott, Mary Scott, Michael Skiro, Debbie Stone, Dorothy Vetter, and Karen Worth.

These individuals volunteered their time to help tabulate the teacher response sheets to the draft curriculum: Belma St. Pol-Maydieu, Mary Anne Cohen, and Arnita Cooper.

This document was compiled and written by Kim Marshall, acting as Special Assistant to the Superintendent.